ISSUE ONE

2009

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NASMA

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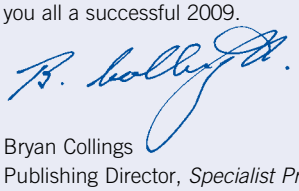
MESSAGE FROM BRYAN COLLINGS

I hope that all our readers had a good festive holiday and are now firmly in the groove, working to make the best of 2009.

In response to strong customer demand, we are increasing the publication of this magazine to four times a year and have a lot of interesting articles coming forward to offer printers practical solutions to the everyday issues they face during these challenging times. The only way to guarantee receiving the next four issues (covering 12 months) is to subscribe at www.specialistprinting.com for a total of only €50, $75 or £40. As one of our 10,000 readers covering all five continents, you are part of a 'club' who benefit from receiving the latest information on technological developments, so to make sure you don't miss out on future issues, **apply NOW for your subscription**.

Although 2009 has started with a very poor prognosis for global markets driven by a failing US economy, there are signs that actions being taken by the various US administrations should give the stimulus needed, and I'm sure that all of us are doing all we can to encourage our customers to keep trading aggressively and not to batten down the hatches. They always say that the best time to spend money on a new suit is when you're out of work and the same applies in business; 2009 is a time to keep promoting your business to keep its name in the forefront of your customers' minds, especially as times are a bit more competitive than usual right now!

We look forward to receiving your subscription order and to meeting many of our readers and advertisers at trade shows this year. In the meantime, I wish you all a successful 2009.



Bryan Collings
Publishing Director, *Specialist Printing*

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NASMA UPDATE

NASMA

Parnell Thill, Chairman of NASMA

Harold Johnston, NASMA's Executive Director

THE SCHEDULED SEMI-ANNUAL NASMA MEETING WAS HELD IN CHICAGO ON 5-6 NOVEMBER 2008 AT THE WESTIN MICHIGAN AVENUE HOTEL. ONE OF OUR GUEST SPEAKERS WAS FRAZER CAMPBELL OF *SPECIALIST PRINTING*, WHO GAVE US THE HISTORY OF THE MAGAZINE'S FORMATION AND ITS SUCCESS TO DATE. FRAZER ENCOURAGED NASMA TO BE PROACTIVE IN USING THE MAGAZINE TO COMMUNICATE WITH CUSTOMERS VIA EDITORIALS AND ADVERTISING.

Joe Anderson from Pratt Corporation of Indianapolis reported his company's progress with GSP (Sustainable Green Printing Partnership). Reportedly, Pratt is the first US-based company in our industry to engage in this initiative. Joe indicated that there are several major corporations in the retail segment promoting this initiative, the general adoption of which would significantly impact the print providers.

NASMA continues to respond to its members in ways suggested by members themselves. For example, in Q1 2009, the addition of a 'Business Metrics' will accompany the annual market survey. Thus, the combined report and real market share data relative to products manufactured and key business metrics will represent truly unique and valuable data virtually unavailable elsewhere.

ST Media Group will host NASMA's quarterly Membership Business Outlook Barometer Survey, which will now include non-NASMA members' participation. This is real news, since this Business Outlook Barometer is among the association's most popular tools. Opening the Barometer up to other manufacturers is sure to make the Barometer even stronger as a business tool. ST Media Group will indicate that the Barometer survey is sponsored by NASMA, which should give increased market recognition to our organisation.

The next meeting is scheduled for May in Kansas City.

Parnell Thill
Chairman, NASMA SP

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ESMA MAKES CHANGES FOR THE FUTURE

Peter Buttiens, General Manager, ESMA

DURING THE GENERAL ASSEMBLY OF 14 NOVEMBER IN BARCELONA, SPAIN, ESMA MEMBERS VOTED FOR A REMODELLING OF THE ASSOCIATION'S BOARD CONSTRUCTION. THE NEW BOARD WILL CONSIST OF A STEERING COMMITTEE AND THE CHAIRMEN OF THE COMMITTEES.

The decision was an important step due to the growing number of members and activities. The changes should help the organisation in its further development and growth. Currently, ESMA has almost 60 members representing manufacturers from screen, digital and pad printing technologies.

Since I started to work for the association, I have been developing a global plan for the future of the current members but also for potential new members in Europe. Market feedback showed that ESMA was more a closed group of manufacturers instead of a leading association to represent its members and their technology in Europe. The first step was to develop a plan for more value for its members through its committees, projects, events and global information. An association such as ESMA is not only important for good networking within the industry, but is also becoming an important representation as a group of manufacturers in the European Community.

When the Board decided to hire a full-time manager and to build a small team which could develop the daily activities of the association, this was a very important step for the future of the association! The current new changes within the Board will stimulate further development of the association and bringing more value for its members and the industry.

The Steering Committee is represented by eight people from the different activity groups of ESMA members. This way, all the different activities of ESMA members are represented within the Board. The goal of the Steering Committee is to work on long-term strategies, new objectives to build more value for its members and to develop relationships with other associations within the industry.

ESMA is proud to announce its new Chairman, Harutiun Manoukian, President & CEO of Kiian in Italy and the new Vice-Chairman, Arthur Vanhoutte, President of Mutoh Europe in Belgium. It shows that ESMA is opening its association for the integration of the digital manufacturers within the global association.

Other members of the Steering Committee are Jerry Avis (Fujifilm Sericol, UK), Jon Bultemeyer, Treasurer (Marabu, Germany), Paul Cripps (EFI, The Netherlands), Peter Detzner (ISIMAT, Germany), Ingo Kubler (Sefar, Switzerland) and Gilles Paglinghi (MACtac Europe, Belgium).

"The whole market into which all ESMA members are involved, has struggled with many matters such as worldwide financial crisis, pressure from other technologies, constant volumes transferred into other continents, wider fluctuation of exchange rates and oil prices. Year 2008 shows a definitive big change in the world; business and markets are not the same anymore," says Harutiun Manoukian, the new Chairman of ESMA. "An historical association such as ESMA must follow this change and must fulfil its own duty, supporting all members in improving the quality of their business inside and outside Europe. The Steering Committee is the first step that, together with more Technical Committees, shows its intention to create and strengthen with tangible and useful services for our members, interactive activities inside our association with active roles for our members and connections with more specialised entities and networks around the world."

"As Chairman of ESMA, I recognise that our committees, members and their customers have seen many advantages in ESMA sponsoring *Specialist Printing* magazine," he continued, "as the excellent quality of editorial strongly supports our objective of promoting adoption and the correct use of the various specialist printing processes focused on materials, inks and equipment. As President and CEO of Kiian, it is also great to have a highly technical magazine distributed internationally to our existing and potential customers all around the whole world."

"As the most influential and professional association of European manufacturers for the digital printing and screening industry, ESMA aims to create an optimal framework for successful business, contributing as such to the prosperity and welfare of its members," said Arthur Vanhoutte upon becoming the new Vice-Chairman of ESMA.

Harutiun Manoukian, the new ESMA Chairman

ESMA is also announcing two new committees and chairmen. The IPS (Initiative for Process Optimisation) Committee is currently working on the possibilities for process optimisation in graphical screen printing. In the future, other applications within screen printing will be included, as well as other printing technologies such as digital inkjet and pad printing. The new chairman is Werner Deck of Remco.

The growth of digital manufacturers within the association stimulated the setup of a Digital Committee, which will work on its own specific goals and objectives for its digital members. Currently, a major project has been started for the development of a standard for digital inkjet printing for applications of signage in connection with the ISO 12647 standard. The new chairman is Eli Keersmaekers from Roland DG in Belgium.

Peter Buttiens,
General Manager SP

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THE PERFECT MESH

Steven Abbott offers some insights into what's going wrong with our current meshes and how they might be made a little better

THE POINT OF THIS ARTICLE IS TO STEP BACK FROM THE DAY-TO-DAY REALITIES OF MESH TO RECONSIDER WHAT IT'S SUPPOSED TO BE DOING AND THEREFORE LOOK AT OUR CURRENT MESHES WITH FRESH EYES TO SEE IF THEY CAN IN ANY WAY BE IMPROVED FOR OUR BENEFIT.

If everyone understood what current meshes are doing, then the need for this article would be less. Unfortunately there are many unhelpful myths out there in the marketplace and, sadly, these myths are doing real harm to real printers' real incomes. I make no apologies for speaking out against these myths, because any myth that causes someone from the screen print fraternity to lose their job is a myth too many.

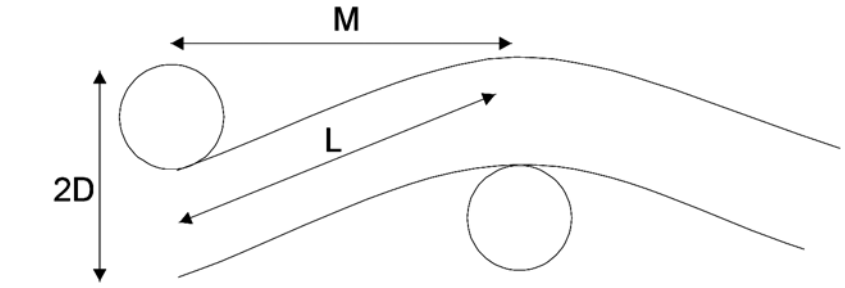
THE MESH DOES THE METERING

The myth that the ink deposit depends on the squeegee or the stencil has caused more job losses than any other. The squeegee is simply there to fill the mesh and scrape off any excess ink. In conventional screen printing, the stencil is there mostly to define the shape of the print. It's the mesh which controls the thickness of the ink deposit. Those who like to live dangerously (and unprofitably) can have a modest effect on ink deposit by fiddling with the squeegee, and of course if you need an extra few µm of ink in a small open area then you can control this with the stencil thickness, but overwhelmingly, it's the mesh that does the metering.

So the first thing we need to know about the perfect mesh is how much ink is in it just before the mesh comes out of the ink and away from the substrate – the 'ink-in-the-mesh-at-the-start'. This is just a matter of geometry. For engineered meshes such as those grown in nickel, the manufacturers do this calculation accurately. One of the scandals of the screen industry, in my opinion, is that woven mesh manufacturers don't do the correct calculations; instead they multiply an 'open area' by the mesh thickness and quote that value. There is no justification for this and the results are often misleading. The real formula is well-known and all woven mesh manufacturers should be quoting this value, but they don't.

MESH GEOMETRY

One fact that seems to surprise most printers is that the volume of ink in the mesh just before it rises from the substrate is not the volume of ink that is printed. Just as honey stays on a spoon as it's lifted from the honey jar, so the mesh remains covered with a thin layer of ink. Thus the amount of ink printed is ink-in-the-mesh-at-the-start minus ink-on-the-mesh-at-the-end.



The mesh geometry

$$TIV = 2D - \pi \frac{D^2\sqrt{1+TPM^2D^2}}{2M} = 2D - \pi \frac{D^2TPM\sqrt{1+TPM^2D^2}}{2}$$

The (simplified) formula for Theoretical Ink Volume or 'Ink-in-the-mesh-at-the-start'

There is no simple way to calculate the second value, so it has to be measured. It's not hard to do and it is another scandal that mesh and ink manufacturers don't routinely do this so their customers know right from the start how much ink gets printed. It's not as if they don't have the technical capability, it's just because the mythology of screen printing gets in the way of them providing customers with this simple, vital information. If you need a rule of thumb, then choose 30% as the ink remaining on the mesh. For those who thought that no significant amount of ink remains on the mesh this figure is quite a shock, but anyone who doubts it can check their own ink on their own mesh and reach the same conclusion.

There was a fashionable myth some years ago that some meshes provided 'better ink transfer' thanks to a 'special surface coating'. The simple laws of physics show that no surface coating can have any effect on the

Ink in the mesh at the start

Ink deposit = Ink-in-the-mesh-at-the-start minus Ink-on-the-mesh-at-the-end

The ink is thicker at the edge because of the EOM, but normal in the middle …

… unless you have a very strong mesh under high tension

amount of ink-in-the-mesh-at-the-start (that's just geometry) nor on ink-on-the-mesh-at-the-end (other than, perhaps, Teflon) because the surface of the mesh after the first print is, well, just ink.

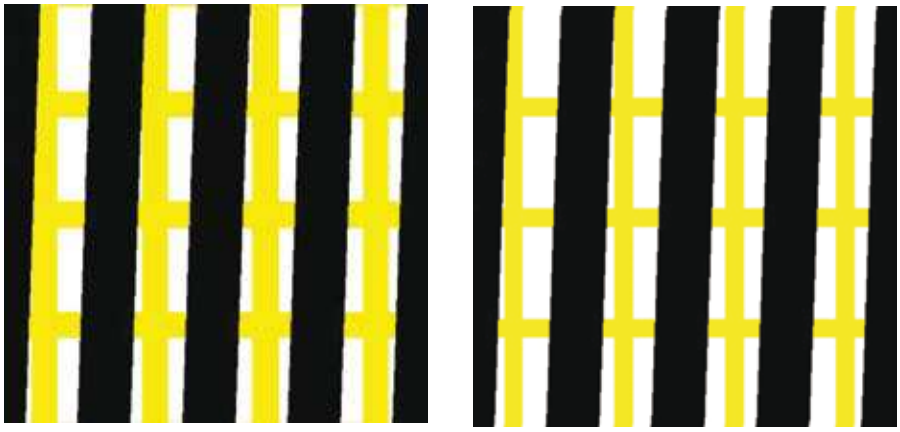
The so-called no-slip condition of fluid flow guarantees that at least a monolayer of ink will always remain on the mesh after contact, so the mesh surface can have no effect whatsoever on the subsequent ink flow. And in reality the remaining ink is a few µm – even less chance for the mesh surface to have an effect on the subsequent print.

But we know that two different versions of 'the same' mesh do deliver different quantities of ink. This is nothing to do with special surface treatment, sometimes it's to do with the precise geometries of the two meshes. Depending on how squashed (or calendared) the two meshes are, the ink-in-the-mesh-at-the-start will be slightly different. That's one reason (amongst many) why it's a scandal that mesh manufacturers don't provide this figure. If you don't know in advance how much ink is in there then your second task – knowing how much remains – is even harder.

BASIC INK DEPOSIT

So far I've been confident in what I've written because the physics is unarguable, but I have to admit to not fully knowing the formulae for how much ink remains on the mesh at the end, hence my rule of thumb above. This really does depend on the details of the mesh. I'm certain, for example, that the mesh knuckles play a large part in controlling this factor, but I've not had the time or energy to work out why Mesh A differs in detail from Mesh B.

Why don't the mesh manufacturers do this as a matter of routine? What I can say with some confidence is that the amount of ink remaining depends very little on the ink or printing conditions. High or low viscosity and high or low speed printing both seem to have only a small effect. You don't need to take my word for it, test it yourself: take a hand bench and slowly print an ink through a stencil, then put that same stencil onto your most advanced press and repeat. You will find almost no difference in the amount printed. This is common knowledge but because of the mythology of complex controls on expensive presses, this basic fact is ignored.



Thin mesh good, thick mesh bad for printing fine lines

So, what is the perfect mesh in terms of basic ink deposit? It is one where you know beforehand (preferably with data provided by the mesh manufacturer) the two terms, ink before and ink after, and where the difference (i.e. the ink left on the substrate) is exactly the deposit you require. If you need an extra micron or two, by all means add a few microns of EOM to your stencil – unless, of course, you are printing large open areas where the stencil has no effect whatsoever.

If you have a very high tension and a very rigid mesh then the squeegee won't force the mesh into contact with the substrate, instead it will remain suspended above the mesh by whatever your EOM happens to be. For some people this is a definition of perfection, and the liquid crystal meshes are outstanding at doing this.

But there's a downside to all that lengthwise strength for the liquid crystal polymer – it has little strength across the fibre. So when it is woven it is easily squashed and produces a fat fibre, which is something you generally don't want. These fat fibres also invalidate the simplified Theoretical Ink Volume which assumes circular fibres. A more appropriate formula is available for these highly elliptical meshes.

THIN IS GOOD

Screen printing would be even better if it weren't for the screen getting in the way. The only good mesh for printing is a thin mesh – when viewed from the top. The perfect mesh would be just a few microns wide yet with a height able to deliver the required quantity of ink. Only nickel meshes can aspire to this ideal. Thin woven meshes are, for obvious reasons, not very deep. Stainless fibres don't get squashed much on weaving, so they are the best practical combination of thin and deep.

Because thin fibres are necessarily weaker than thick ones, for stability of the screen the only way to have enough fibre to resist the stretching forces is to have more threads per unit length. Because fibre area goes as the square of the diameter and linearly with thread count, it's not obvious which is the best trade-off of maximum strength versus minimum mesh getting in the way. It would have been helpful if mesh suppliers gave a figure in their data sheets recording the amount of fibre per unit length but, alas, they don't.

STABILITY UNDER TENSION

The perfect mesh will not creep (relax) under tension, even the reasonably high tensions that good screen printers use. With low creep, tensions remain stable and images remain with perfect registration. There are two aspects to the creep and these are not sufficiently disentangled for

users to understand and control.

The first aspect is the properties of the fibres under stress. For a polymer such as polyester, the individual polymer chains can gradually straighten out and slip past each other. For stainless, the grains can slip and elongate. For the liquid crystal polymers, the polymer chains are so straight to start with that there is not much that can change under stress, so the creep is particularly low.

The second aspect is what happens at the knuckles of the mesh. To a certain extent, the fibres are locked against each other when they get bent at the knuckles. However, with vibrations, stresses from the squeegee and, even, lubrication by solvents / inks, the knuckles can slip past each other, resulting in creep.

It would be ideal if mesh providers told us how much creep comes from their fibres (they could provide this information from experiments on unwoven fibres) and how much comes from the knuckles, which in turn depends on how well the mesh has been woven, how much it's been calendared and how solvents / inks can interact with the mesh surface to encourage slippage at the knuckles. It's deeply unfortunate that such creep-related data is not part of the data sheet of all reputable mesh suppliers.

There's one other aspect of tension stability that can prove mysterious if you're not alert to it. Polyester fibre expands by about 15 µm/metre for every 1% increase in relative humidity. A large change in humidity can result in a surprisingly large dip in tension. So another definition of perfection (which stainless achieves) is an absence of expansion from absorption of moisture or solvents.

DOWN WITH KNUCKLES

Knuckles are bad for at least three reasons: firstly they allow creep, secondly they contribute strongly to mesh marking (we know this because the patterns of mesh marking are highly variable and often correlate with alternate knuckles) and thirdly, they are places for old bits of stencil and ink to accumulate and cause image ghosting and uneven mesh marking.

If any mesh manufacturer could come up with a 'knuckle treatment' which reduced creep, made each knuckle identical and filled up the little spaces where junk gets trapped, they would be much closer to having the perfect mesh. Of course, the nickel meshes that are without knuckles are a shining example of the good things that happen when knuckles don't exist at all.

I won't name any names, but one mesh manufacturer caused a lot of problems in the field by shipping mesh which had lumps of their surface treatment chemicals trapped in the knuckles. It was very difficult to spot these lumps and correlate them with the problems they caused. This once again emphasises the fact that mesh manufacturers should really attend to the fine details of the knuckles if they want happy customers.

THE CURSE OF SCATTERING

As printers go to finer lines / dots, the light scattered from the meshes during exposure is a serious problem. The stencil-maker has to choose between under-exposing to maintain resolution but with compromised stencil performance, or over-exposing and losing resolution but getting great stencil performance.

If any polyester mesh manufacturer could source fibres without scattering particles in them, then the need for yellow mesh to help reduce over-exposure would disappear. 'Pure PET' fibres which were crystal clear would be a huge improvement on the current scattering fibres because the yellow dies can't fully quell the scattering.

The stainless mesh suppliers have a different problem. By definition stainless is stainless, so it's hard to create blackened fibres which give a wonderful improvement in exposure performance. It's hard, but not impossible. It is again deeply unfortunate that blackened stainless is not offered as a matter of routine for those doing fine-line printing on stainless.

ADHESION

The fashion some years ago for PET fabrics that gave 'better ink transfer characteristics' was a waste of precious development resource; none of these treatments could possibly help with 'ink transfer'. It would have been far better if the work had gone into treatments that helped with the knuckle issues or treatments for helping mesh adhesion.

Happily, one of the up-sides of some of these treatments is that they genuinely helped get good stencil adhesion. This in turn made it easier for suppliers of emulsions and capillary films to fine-tune their products for performance in other areas such as resolution or print life. It's harder to do this fine-tuning if you have to keep checking for basic adhesion.

THE RIGHT COUNT

The perfect mesh has a known thread count that's even across the width of the screen, is equal in both directions and is the same from month to month, from year to year. I'm not one who thinks that super-high accuracy of thread count is very important; it doesn't, for example, help much with moiré – at best it hides a moiré when the smart thing to do is to change to a different print resolution or different mesh count to avoid the mathematical certainty of moiré. I think that knuckle evenness (not something I've heard many people talk about) is far more important than perfect thread count (which is often portrayed as being super-important).

I've been pretty hard on the mesh manufacturers in this article, but is it their fault that we are provided with bogus 'ink volume' numbers, that we don't have data for ink-on-the-mesh-at-the-end, that we don't have 'amount of fibre per unit width' data, that we don't have good creep data, that knuckles are so unsatisfactory, that we don't have clear PET or blackened stainless and that myths of 'better ink transfer' have wasted resource?

To a certain extent the answer is yes, but we, the customers, need to take more of the blame. The science of what makes a perfect mesh is easy to understand and we could have told our suppliers that unless they raised their game, we'd shift our purchases to their competitors. But we didn't do that; we buried our heads in the sands of sloppy thinking and we allowed myths to haunt this industry for decades. So we have the meshes we deserve.

Once we agree to share the blame, the way forward is easy. It's worth reminding ourselves that what we get when we buy a mesh is pretty amazing: all those tiny threads all perfectly woven, metre by metre, year after year. Yes, these meshes are pretty good under the circumstances – but why should we accept 'pretty good'? We can't get perfection, but by choosing to spend our precious resources with those mesh manufacturers who in turn spend their R&D money on activities that give us what we need, then although we'll never reach perfection, at least we'll get closer to it. SP

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NOTE FROM THE PUBLISHING DIRECTOR

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SELECTING PHOTOEMULSIONS FOR DIGITAL UV EXPOSURE IN SCREENPRINTING

Roland Studenroth examines the current technology and development of products for the digital UV exposure of screen printing emulsions

FOR SEVERAL YEARS, DIGITAL UV EXPOSURE FOR THE PRODUCTION OF SCREEN PRINTING STENCILS HAS ESTABLISHED ITSELF ON A BROAD FRONT AND CAN NOW BE REGARDED AS AN ESTABLISHED PROCESS. THE DIGITAL PRODUCTION OF SCREEN PRINTING STENCILS CAME ABOUT BECAUSE THE MARKET AVAILABILITY OF REPRO-FILM HAS DRAMATICALLY RECEDED, AND IN A FEW YEARS IT WILL BE INCREASINGLY DIFFICULT TO OBTAIN HIGH QUALITY SILVER-BASED FILM FOR IMAGE COPYING.

The rapid advance of digital UV exposure is particularly due to the fact that there are savings in the costs for film and in other consumable materials such as ink or wax, which these rival systems require. Although wax and ink systems are cheaper as an initial investment, their inherent weaknesses lie in their additional running costs due to the consumption of wax or ink, and the resolution quality is not as high as for digital exposure.

SYSTEMS FOR DIGITAL EXPOSURE

There are currently two different types of technology for digital exposure available:

- Exposure via micro-mirrors (Digital Mirror Device, DMD)
- Exposure via LED UV laser at approximately 405 nm (blue laser).

With DMD technology, the whole spectrum of a metal halide lamp is projected via micro-mirrors (approximately 10-20 µm edge length, depending on type) onto the coated and dried printing screen and with digital guidance of the micro-mirrors, the UV light is accurately transmitted onto the screen as required, thereby creating the image. Systems vary from manufacturer to manufacturer, mainly in UV sources and optical devices. The principle of the light path of a DMD system is shown in Figure 1.

For digital exposure using LED UV lasers at approximately 405 nm, up to 128 laser beams are arrayed on a disk and bundled through an optical device to create the image on a screen. Figure 2 illustrates a typical array. Single laser beams have a diameter of approximately 40 µm and by overlapping or interpolation, they enable very good straight lines to be imaged.

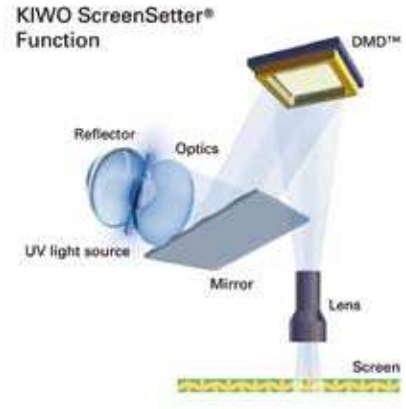

Figure 1: The principle of the light path of a DMD system using the KiWo ScreenSetter as an example

FORMULATION OF SCREENPRINTING PHOTOEMULSIONS

Primarily, diazos and / or SBQ-endowed polyvinyl alcohol (where SBQ is stilbenium quarternised) are responsible for the actual imaging. When diazo-sensitised photoemulsions are used, the UV exposure cross-links the water-soluble polyvinyl alcohol, which then becomes insoluble (see Figure 3).

If other UV-reactive components are included, they are referred to as diazo UV-polymers or 'dual-cure' products. With the appropriate selection of components, different UV reactivity can be achieved; the main influencing factors are the chain lengths of the polyvinyl alcohol, the ratio of hydrophilic and hydrophobic components and the concentration of diazo. Simple diazo photoemulsions without UV reactive resins are not generally as reactive, whereas diazo UV-polymers could be classified as medium-reactive within the general spectrum of photoemulsions.

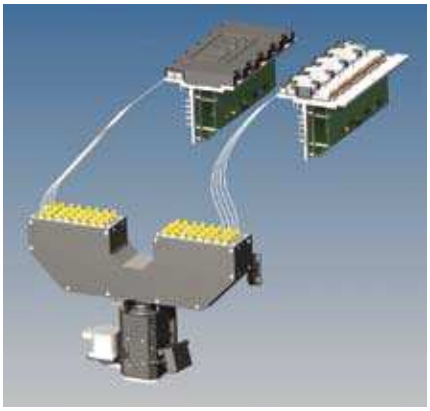

Figure 2: LED UV laser unit using the Lüscher JetScreen DX as an example

In SBQ sensitised products, neighbouring SBQ groups are linked by UV reactivity via a quadrinomial ring; the SBQ polyvinyl alcohol then also becomes water-insoluble (see Figure 4).

The reactivity of SBQ sensitised products can be adjusted by the chain lengths of the polyvinyl alcohol, the amount of SBQ groups and the ratio of hydrophilic to hydrophobic polymers. 'Dual-cure' versions are also included here. As a rule, the reactivity of SBQ photoemulsions is significantly higher than that of diazo-sensitised products. These can be classified as highly to very highly reactive (e.g. projection emulsions).

PHOTOEMULSIONS FOR CTS SYSTEMS

CTS systems based on micro-mirror technology are more common, but there is – depending upon the manufacturer – a certain bandwidth of effective exposure energy. Powerful systems harmonise best with medium reactive diazo UV-polymer emulsion (e.g. Azocol Poly-Plus S) and weaker systems need the so-called standard SBQ emulsions (e.g. Polycol Supra Plus); in general, highly reactive projection emulsions are not really necessary.

As the UV-light source of DMD systems (metal halide lamps) emits a similar light spectrum as in conventional screen exposure, there are no special requirements regarding the choice of photoemulsion. However CTS systems based on LED UV lasers emit light at around 405 nm, so there were initial reservations as to whether the photoemulsion had been fully cured. It has been convincingly proved otherwise and just as with DMD exposure, the first choice is either medium reactive diazo polymer or standard SBQ emulsions.

Incidentally, it has been discovered that colouring the emulsion violet harmonises particularly well with the wave-length of 405 nm. LED UV laser systems offer the possibility for the interpolation (overlapping) of the laser dots; this effectively gives a significant

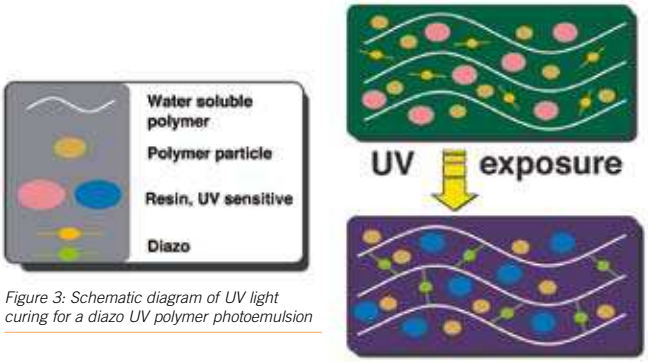

Figure 3: Schematic diagram of UV light curing for a diazo UV polymer photoemulsion

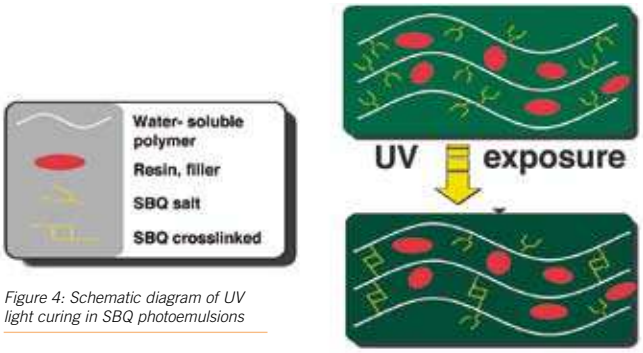

Figure 4: Schematic diagram of UV light curing in SBQ photoemulsions

increase in exposure energy, so you have to fall back on to photoemulsions with a higher exposure tolerance (Diazo UV polymers such as, for instance, Azocol Poly-Plus S).

SPECIAL CTS PHOTOEMULSIONS

With due regard to what has already been stated, it should actually be possible to find a suitable product from the wide range of photoemulsions for each type of system and for each application. Where 'off the shelf' solutions are inadequate, special CTS photoemulsions have to be developed. The main reasons for the emergence of special CTS photoemulsions are that several central influencing factors may deviate from the conventional work process, such as:

- the effective delivery of UV energy (exposure time)
- the image quality (pixel structures)
- the number of screens per day (workflow).

With the help of special CTS emulsions, you can attempt to re-attain, approach or even optimise the previous rate of workflow. In several cases, SBQ-based CTS emulsions were developed to (practically) compensate for longer exposure times.

IN SUMMARY

Whether it's DMD or LED UV laser technology, digital UV exposure of screen printing emulsions is firmly established with a multitude of systems on the market, and is currently a recognised technology for the production of screen printing stencils.

Systems technology continues to be further developed towards achieving even finer resolution and making the units themselves easier to operate. KiWo keeps a watchful eye on technological developments, adapting its photoemulsions to new technology and supporting customers with the development of special CTS emulsions to create optimum workflow. SP

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COLD LIGHT FOR GREEN AND PROFITABLE PRINTING

Jenia Ovchinnikova outlines the advantages and environmental benefits of UV printing

A NEW TYPE OF WIDE FORMAT PRINTING, UV PRINTING, HAS BECOME POPULAR OVER RECENT YEARS. ADVANCES IN UV PRINTERS COMBINED WITH CUSTOMER DEMAND FOR SPECIAL REQUIREMENTS, SUCH AS PRINTING WITH WHITE COLOUR AND CUSTOMISED PRODUCTS, ARE STIMULATING THE DEVELOPMENT OF THIS NEW MARKET. TECHNOLOGY ALLOWS A PRINTER TO GIVE IMPRESSIVE RESULTS IN QUALITY, SPEED AND APPLICATION, ALLOWING UV PRINTING TO COMPETE WITH TRADITIONAL METHODS OF SOLVENT AND SCREEN PRINTING.

Another important aspect is environmental issues. Consumers around the world are increasingly influenced by non-commercial factors such as the environmental impact of products, so to be environmentally-friendly means to be up to date. Manufacturers of printing machines have responded to these issues by designing ecological printers based on new technologies, and these machines are not cheap. At the same time print shop owners want to get more profit as well as a quick ROI (return on investment).

ENVIRONMENTALLY-FRIENDLY TECHNOLOGY

The NEO UV-LED Evolution printing machine from Sun is based on environmentally-friendly UV-LED technology. Until recently it was thought to be impossible to cure ink with LEDs because major companies had failed when experimenting with it. Sun launched these printers in 2007 and since then, improvements have made them more productive and safe. Last year a new model was launched with new electronics, a belt feeding system and stylish design.

Any rolled and rigid materials up to 20 cm (8 inches) thick and 70 kg in weight can be used, enabling direct printing on a wide range of substrates such as plastic, tile, glass, mirror, wood, canvas, metal, PVC and banners, and even heat-sensitive and exacting media can be used successfully, as well as thin film, thin plastics, foam plastic (ceiling tile), paper and leather ('cold' LED light doesn't damage or melt expensive media like UV lamps can).

An example of printing onto plastics

DIRECT PRINTING

Previously many people used to print on adhesive film and then paste the material over it, which was not convenient and gave problems such as ridges or difficulties in accurately cutting the edges. Direct printing saves time and cuts down expenses for a new product – one UV-LED printer can cover many markets for outdoor and indoor printing, such as vehicle graphics, souvenir printing, printing onto textured substrates, and customised products such as printing onto furniture, doors, wallpaper and windows. Printing onto doors, facades, guitars or other thick materials of up to 20 cm is easy, and printing sheet materials of any length is possible due to the modular design of feed tables, which can be combined to over 10 metres in length.

Printing onto tiles

NEO UV-LED Evolution is an ecologically-friendly technology that provides curing without heat and ozone release (UV lamps generate ozone during the printing process, which can lead to health problems). Unlike UV lamps, LED doesn't contain mercury and toxic heavy metals. There is no need to provide extra protection for equipment and personnel, or to use powerful and expensive ventilation systems. The printed image is safe and can be used everywhere – at home, in kindergartens etc. UV-LED blocks stay cool during the printing process – the working temperature of 36°C eliminates the risk of burn.

The NEO UV-LED Evolution is ready to run one second after switching on with no warm-up time needed. The UV-LED units have a life of 40,000-100,000 hours (about 14 years of 24-hour operation under normal conditions according to recommendations). Power consumption is low and the coefficient of efficiency is high.

Printed faceplates

Volumetric printing on tile with pearl effect

Glass is increasingly being used in interior design

CUSTOMISATION

The NEO UV-LED Evolution is a good solution for printing customised products such as decors for furniture items, window sills, doors etc. Special applications include the following:

- Volumetric printing on glass: glass is increasingly being used in interior design, and UV-LED technology is simpler and less laborious than many other techniques used in the glass decoration industry.
- Ceramic tiles: printing with a pearl effect means you can use the cheapest tiles, make a masterpiece, then sell it for a profit.
- Wood panels: this environmentally-friendly material combined with environmentally-friendly technology is good for the decoration of children's rooms. Underprinting with white ink neutralises the original colour of substrates used to get a bright image.
- Canvas: this can range from stylish images of friends with photographical effects, to famous pictures.
- Mobile phone faceplates: even small objects are very clear.

Special printing effects are possible

IN SUMMARY

The NEO UV-LED Evolution printer is ecological, productive and profitable. Its width of printing is 2.5 m and it can accommodate a thickness of material of up to 20 cm (8 inches). It uses the Konica Minolta 14 pl print head and CMYK + White (+ varnish). It gives versatility over media and significant electricity savings, and ecological safety. It enables users to move outside traditional graphics markets with products such as individually printed furniture items, glass printing and other customised products. SP

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PIONEERING SUBSTRATES

Gianni Robertazzi describes the application possibilities of new substrates

IN THE FUTURE, PRINT MATERIALS WILL GAIN IN IMPORTANCE FOR THEIR TACTILE POSSIBILITIES AS WELL AS FOR BEING CARRIERS OF VISUAL INFORMATION. THE COMBINATION OF TOUCH AND SIGHT GIVES A PRODUCT AN EMOTIONAL VALUE.

A long time ago, Aristotle came to the following conclusion: the sense of touch is the most important and all the other senses are secondary. Hardly any manufacturer leaves touch to chance, whether it is the haptic laboratory of automotive manufacturers, designers of industrial tools or lifestyle products. Thermoplastic elastomers and soft touch coatings can enhance tactile features. These often call for a pad- or screen printed label or decoration.

WHAT ARE THERMOPLASTIC ELASTOMERS?

Thermoplastic Elastomers (TPE) are plastics which, at room temperature, possess the physical characteristics of elastomers (rubber) and which, when in contact with heat, become ductile and so show thermoplastic characteristics. Mostly compounds, elastomer alloys are also a mixture of finished polymers.

A sample for printing onto packaging

The material consists of several types of molecules with specific physical characteristics depending on the ratio of, for instance, polyolefins and elastomers. The greatest use lies in multi-component injection moulding, which offers the possibility of binding together various raw materials as 'hard soft solutions'. TPE materials can be applied as soft components for the first time.

TPE can be used in the production of extruded products such as tubes, or of multi-component injection moulds. It offers new design possibilities (shape and haptics) and is virtually 100% recyclable.

SOFT TOUCH SURFACES

This consists of a one or two component varnish which can be either water- or solvent-based. The uppermost coat, called the 'top coating', is distinguished by a soft surface. This upgrading of the whole product is considered to be the greatest advantage of a soft touch varnish. Rigid substrates such as plastic or metal are used as carrier materials.

Once the varnish is hardened and fully dried, printing with standard products is often difficult. Therefore it was often necessary to print right after varnishing. With non-polar TPE materials, the choice of the right pre-treatment method and energy determines the success of the adhesion.

This is further complicated by the need for an additive for injection moulding, which acts as an oleophobic on the contact area and so prevents or makes ink adhesion more difficult. Therefore this requires pre-treatment with flame or plasma, which simultaneously adopts the function of cleaning the surface as well as increasing surface tension.

PAD AND SCREEN PRINTING

Marabu has developed the Tampaflex TPF, a printing system which incorporates a printing ink for TPE and soft touch varnish at the same colour injection moulding. With Tampaflex TPF pad printing ink, customer demands for good adhesion, high chemical resistance and flexibility can be fulfilled.


A sample of automotive use

Tampaflex TPF offers printability and good adhesion on TPF material and soft touch coatings. It is suitable for rubber substrates, with high chemical resistance, optimally adjusted rheology and high applicability

THE BOTTOM LINE

The new type of substrates such as TPE and soft touch surfaces will increase in importance. Competitive pressure encourages manufacturers to stand out from the masses through differentiation. Tampaflex TPF is an outstanding solution for printing onto TPE and soft touch surfaces. SP

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THE ICC COLOUR PROFILE

Klaus Kompatscher describes the background and standards of the International Color Consortium's colour profiles

NOWADAYS ICC COLOUR PROFILES ARE OMNIPRESENT IN IMAGE PROCESSING AND IT IS UNTHINKABLE TO DO WITHOUT THEM. A PROFILE DESCRIBES THE COLOURS A DEVICE CAN REPRODUCE AND MAKES IT POSSIBLE TO DEFINE EACH ONE UNIVOCALLY AND INDEPENDENTLY FROM THE DEVICE, MAKING IT POSSIBLE TO PREDICT THE OUTCOME OF COLOUR WORK.

Even before the foundation of the ICC (International Color Consortium) in 1993, many companies used colour profiles to clearly define colour information within their own product families, but these were proprietary systems that could not be used inter-company. Thanks mainly to Apple and a number of individual European competitors, top companies in the image-processing sector got together to develop a shared standard through the foundation of the ICC.

The ICC standard (currently v4), among other things, regulates the structure and content of an ICC colour profile. In detail, ICC profiles are organised into seven classes:

- Input
- Monitor
- Output
- Device link
- Colour space conversion
- Abstract
- Named colour.

This classification makes it possible to adjust an ICC profile to the foreseen use. For example, an input ICC colour profile only requires conversion of the colorimetric space of the device (RGB scanner or digital camera) in the PCS (Profile Connection Space). For a monitor or output class profile, the inverse conversion is also important. For each of these transformations there is a specific table in an ICC colour profile.

THE COLORIMETRIC SPACE

The ICC standard envisions the possibility of using XYZ or Lab as a profile connection space (PCS). Both are colorimetric spaces independent of the device and are used to define, univocally and whatever the device, colour data that instead does depend on the device (RGB or CMYK); in other words, colour information not transferable 1:1 to another device.

The XYZ colorimetric space has theoretical RGB base colours and is therefore used for monitor class profiles. On the other hand, Lab is an equidistant colorimetric space and is used for all the other classes. This fact makes it possible to numerically define differences in colour with a value (?E) that is expressed the same way worldwide. Measured values and tolerances establish whether or not a colour has been correctly printed. The variations to which an observer is exposed have no importance.

An exception among colour profiles is the device link profile, in which no PCS is used because it only permits conversion from the original device to a given destination device. The advantage of a device link profile is that the structure of black can be kept or, if necessary, modified in a targeted way. On the other hand, in a CMYK to Lab to CMYK conversion (original profile to destination profile) the original separation is lost. The disadvantage is that a device link profile can be used solely for a given conversion (device to device) with a rendering intent. The rest of this text will be devoted mainly to the output profile and the colorimetric workspace.

RENDERING INTENTS

Therefore a profile contains tables converting from Lab to the device's colorimetric space and vice versa, in a distinct way for every rendering intent. What usually happens is that the original colorimetric space is larger, meaning it can show more colours than the destination space. This means that at least one calculation method is required to convert colours 'out of gamut' into the destination colorimetric space. The ICC standard describes four of these calculation methods (rendering intents, RI), the first two of which are most commonly used:

- Perceptual (photographic)
- Relative colorimetric
- Saturated
- Absolute colorimetric.

Except for the Absolute colour method, the first step in conversion is to relate the original white to the destination white and consequently adapt all the other colours: a tonality of colour is, in fact, always interpreted by the human eye in relation to the white point. With the relative colour method the 'in gamut' colours are reproduced in a way that is colorimetrically correct, while the 'out of gamut' colours are converted into the closest possible colour tonality. This might give 'out of gamut' colours the same colour tonality.

With the perceptual method this cannot happen because in this case, the colours within the destination colorimetric space are closer together, creating space for the 'out of gamut' colours. This procedure retains the image effect but can lead to an excessive loss of contrast, depending on how many colours are 'out of gamut'. In this case even the black point is involved in the rendering intent; that is, here too with the relative colour calculation method, details may be lost due to 'clipping'.

With 'black point compensation' Adobe developed an unofficial standard that avoids this problem. Quite simply, a kind of perceptual method is used for the black in the destination chromatic space. In practice this is the fifth RI that, although widely used, has not yet been included in the ICC standard.

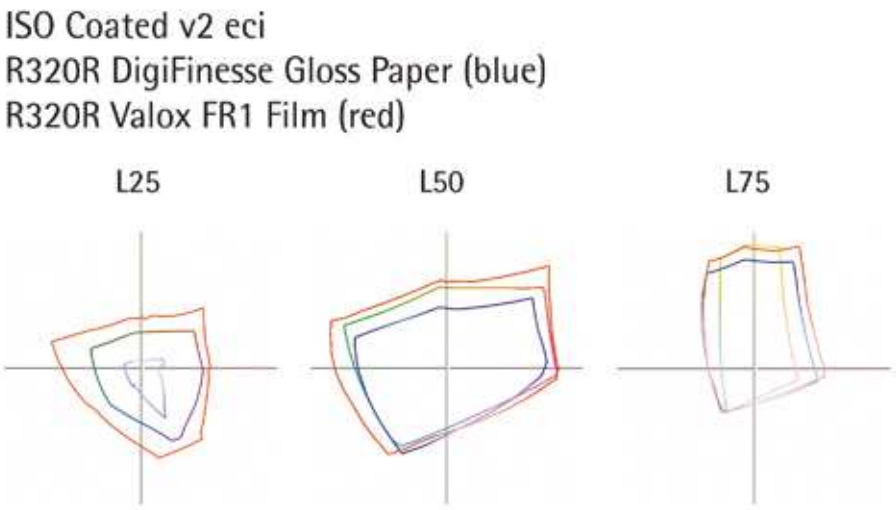
For these reasons it is clear that the smaller the degree of difference between the original profile and the destination profile, the fewer problems there will be in converting an image file. For the same reason, it makes no sense to create documents in the Lab colorimetric space; this would, in fact, have some advantages but could also create a quality problem because of its size.

ICC PROFILE PRECISION

The quality of an ICC profile can be defined basically by size, meaning that the number of bases (8 or 16 lut) is determinant to ICC profile precision. Many bases make sense, although to create a profile many colour fields (more than 1200) are measured.

This characterisation data is extremely important to ICC profile precision. Examining

The output of an image is affected by the Rendering Intent (RI)



A comparison of the gamuts of three different colour profiles

all the aspects of measurement technology is beyond the scope of this article, however in the inkjet printing process and in its innumerable supports, the requisites of the measuring instrument and the user should not be undervalued.

The right balance between print quality and economy is set by separation. The choice of software for profile creation is significant only in the case of perceptual RI. For perceptual RI the ICC has left open many possible interpretations, and so in this case software creators may distinguish themselves from competitors with different algorithms.

How are 'out of gamut' colours rendered and what effect is there on 'in gamut' colours and contrast? For the RC RI the 'in gamut' colours have to be reproduced in a way that is colorimetrically correct. Any profiling software should be able to do this and the user can also objectively check this.

What remains at this point is the subjective assessment of an ICC profile, which in the last analysis is the determinant one. The presuppositions are specific standardised environments and lighting preset by the ISO 3664 standard. Naturally, in this case the result is also influenced by monitor quality and its profile or by the test print and its profile.

A COLORIMETRIC WORKSPACE

ISO coated (Europe) and SWOP coated (USA) colorimetric spaces are used by different printers from different manufacturers (Fogra characterisation data). They are also used in inkjet printing because of a lack of alternatives and due to the state of the colorimetric spaces in the printing and pre-printing sector.

The advantage of a colorimetric workspace lies in its use: this common platform means the exchange and processing of image documents is simplified and the risk of using an erroneous profile is reduced to a minimum. Exchanging chromatic data between graphic artists and printing companies is facilitated. The graphic artist sees the colours that can be printed on the screen. Once all the chromatic data is in the colorimetric workspace, converting the printer's colorimetric space is no longer a problem because these spaces are similar in size.

The bandwidth of the colorimetric spaces on an inkjet system is very big because of the variety of printing materials. While the colour profile for paper in the example used is more or less covered by ISO coated, in the colour

profile for film the opposite is true. If the original file contains colours that could be printed in the film colour profile but are not part of the ISO coated colorimetric space, they will be lost in conversion into ISO coated.

Developing ICC profiles is far from finished. One evolution will involve smart colour profiles, processing critical original data to avoid conversion errors. A further field of development will be simplifying the use of ICC profiles. The user must be freed from profile creation and its use; in future all these jobs will be done automatically.

Saving ink by using the proper settings

SAVING MONEY WITH SEPARATION

How can money be saved with separation and maximum ink load? With black ink (K) it's possible to reduce to a greater or lesser extent the percentage of CMY inks for a colour. In theory, a percentage of black or the percentage of grey of a colour composed of 'CMY' 3x20% can be replaced with 20% of 'K', affording a 40% saving on ink. The percentages that can be replaced by black can be checked by means of UCR, GCR, Black Start (long-short black) and Black Width (wide-narrow black).

UCR replaces a colour's percentage of grey with black in the grey-axis area. On the whole a small amount of black in colours prevents grey-out. GCR 1-4 replaces a colour's percentage of grey throughout the colorimetric space, with the possibility of different degrees: 1 is less of black and 4 is more of black. Rho printers can use GCR 4 with no deterioration in image quality.

Black Start indicates the colour load starting from which black is used. For example, a Black Start of 40% avoids black dots in flesh tones because below 40% black is not used. A lower amount uses black even in lighter colour tones. In any case, a long black leads to no significant savings. Black Width limits the amount of black in saturated colours. Rho printers can substitute black even for saturated colours without running into visible disadvantages.

DIFFERING INK LOADS

On the purely theoretical level a maximum ink load of CMYK 4x100% gives the 'blackest' black. In practice, however, starting from a lower load, no increase in density is registered. The opposite can even happen: starting from a given ink load, density tends to lessen. For Rho printers an ink load between 290% and 330% is usually sufficient.

Coarse-grained absorbent supports should be printed on with little ink; rigid supports with good adherence can be printed on with a heavier ink load. It's obvious that a lighter ink load not only saves money but also, on hard-to-print supports, even improves UV drying.

These settings can be taken only to a certain point because prints can grey-out due to a high percentage of black, or not get the best black possible because the ink load is too low. As a general rule, UV inkjet technology is much less sensitive to these settings than other printing processes. In most cases a high percentage of black and low colour load are possible, resulting in cost savings. Obviously, various sets of tests will have to be run to find the optimal settings for one's applications. sp

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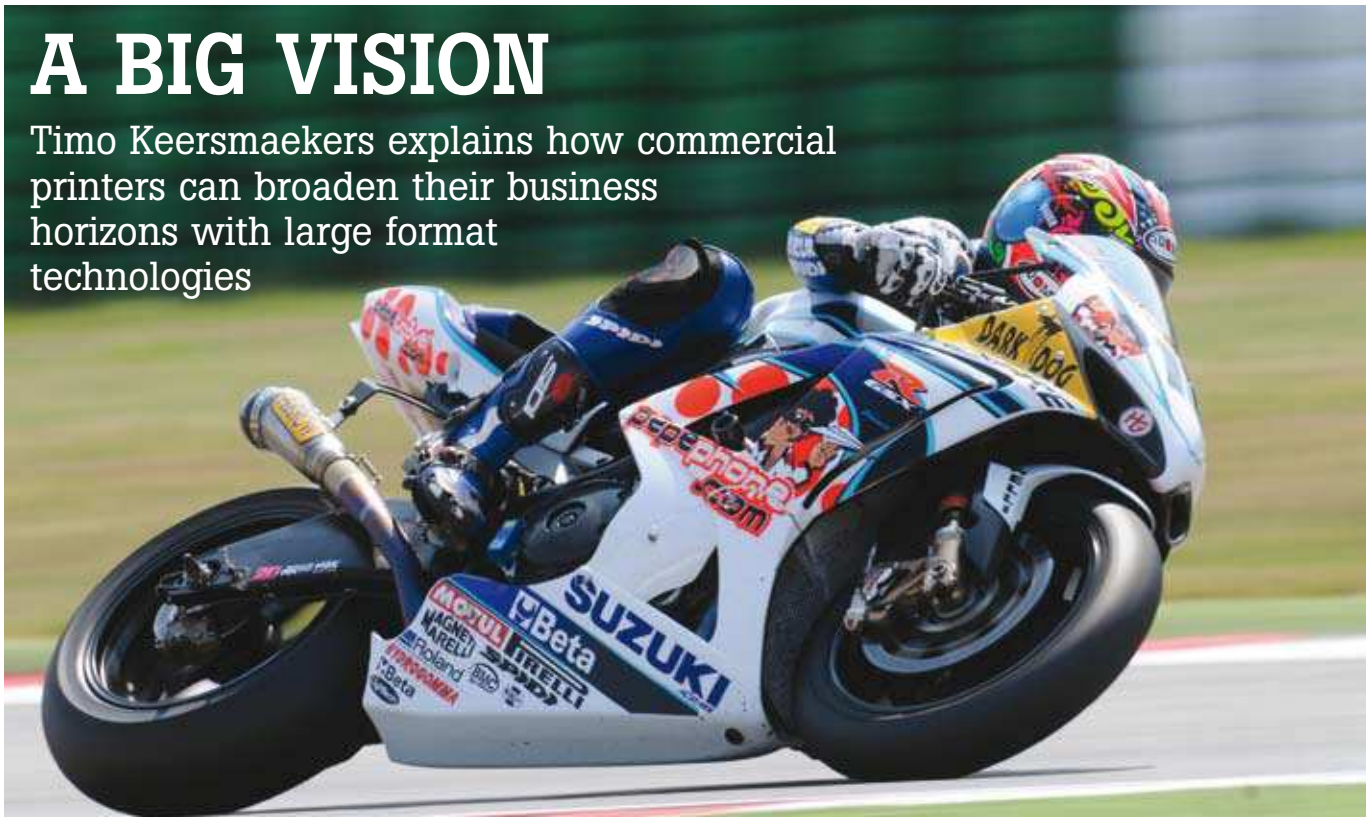
A BIG VISION

Timo Keersmaekers explains how commercial printers can broaden their business horizons with large format technologies



The Alstare racing team produces its graphics with a Roland XC-540

THERE ARE VERY SOUND BUSINESS REASONS BEHIND THE TREND FOR COMMERCIAL PRINTERS TO INVEST IN LARGE FORMAT TECHNOLOGIES AS A COMPLEMENTARY TECHNOLOGY. TODAY'S COMMERCIAL PRINTERS ARE FACED WITH THE SEEMINGLY PERENNIAL CHALLENGE OF MAINTAINING MARGINS IN A MARKETPLACE THAT'S EXTREMELY COMPETITIVE AND BURDENED BY OVER-CAPACITY. HOWEVER, BY PARTNERING WITH THE RIGHT MANUFACTURER, COMMERCIAL PRINTERS WILL FIND THAT TODAY'S LARGE FORMAT TECHNOLOGIES OFFER A COST-EFFECTIVE WAY FOR THEM TO BROADEN THEIR PRODUCT PORTFOLIOS AND KEEP MORE MARGIN IN-HOUSE.

As soon as production of a large format job, for example, is farmed out to a specialist, then so is a proportion of the commercial printer's margin. That's why many commercial printers are looking to invest in an in-house large format capacity as a means of protecting profits and developing additional revenue streams. However, it also gives them the ability to retain control over all elements of a job, rather than relying on third party suppliers. No-one in business wants to lose a lucrative contract because they've sub-contracted parts of the job to a company that doesn't share the same high standards of quality and service.

Roland's display at Drupa

MOVING INTO THE MAINSTREAM

During the last few years, large format has moved from the realm of the specialist into the mainstream and the type of companies investing in large format has become increasingly varied. While Roland has traditionally enjoyed strong market share in the sign-making sector, in recent years it has witnessed a change in how large format technologies are perceived by commercial printers. Roland has an increasing number of installations across the spectrum of graphic arts companies, such as traditional litho houses, copy shops, high street printers, sheet-fed digital companies and in-house printing departments.

Recent ROI (return on investment) figures from Roland for its new VersaArt RS large format printer show that if the machine runs for just a few hours per week, it will pay for itself. The initial capital investment for large format equipment is a fraction of that of litho or high volume digital machines, and large format machines offer an extensive range of applications.

Once a company invests in large format, it should drive business to that machine – buyers of print don't buy a particular production technology, but printed products and applications. Some of this comes down to how well the printer can articulate the benefits of large format to customers and design agencies. To harness the full potential of large format production, print companies could, for example, consider variable data applications. Instead of being content to take an order for a job such as point-of-sale (POS) posters, printers can actively sell to the customer the benefits and added value of using personalisation, or a different substrate such as a mesh, vinyl or banner. The customer is often prepared to pay more for a better application, but sometimes doesn't know what can be achieved through targeted campaigns.

Various applications produced with Roland printers

INCREASING THE SPECTRUM

This vision for business should extend far beyond the traditional products that are associated with large format technologies: signs, posters and banners. These are just the tip of the iceberg. The spectrum of products that can be produced is virtually limitless, restricted only by the imagination, and consequently so too is the number of additional revenue streams.

At trade events, Roland regularly takes the opportunity to display an array of products in its gallery, which includes snowboards, sportswear, serving trays, roller-blinds, shoes, lampshades, fridges and even a grand piano, all adorned with prints made with its machines.

The new VersaUV LEC-300 printer / cutter allows the production of interesting applications, adding form, texture and dimension to prints which can be used to create special effects or a luxurious finish for customised graphics. Using this machine you can, for instance, layer several coats of gloss to create Braille or simulate crocodile skin. The range of media that can be printed and cut is huge – even leather and textiles can be printed.

Incorporating large format digital production is easy for most conventional print companies as they already have many of the requisite skills, such as colour management and experience of design packages; they just have to be shown how to use the RIP, which controls most of the machine's functions such as size, media and colour profiles. Because the operation of today's large format machines is user-friendly, the vast majority of installations end with the customer proficient in running a variety of jobs from day one.

OTHER CONSIDERATIONS

There are other considerations for anyone looking for a large format solution. If space is at a premium, it would make sense to opt for an integrated printer / cutter such as Roland's SolJet XC-540, VersaCAMM series and the VersaUV LEC-300, as this negates the need for two standalone machines. All printing equipment operates more efficiently in a dust-free environment in which temperature and humidity are regulated. However, large format machines are far more tolerant to their ambient conditions than litho presses, so there is no need for additional provision. Substrates shouldn't present a problem as most paper distributors can supply a range of large format substrates.

Printers looking to get into large format are looking beyond the hardware itself to consider the manufacturer's entire solution: machinery, software, service, business support and training services. Roland operates a 'closed loop' system – it has its own engineers, machinery, dedicated training facilities, proprietary inks and RIPs so the printer deals with a single supplier. Its customers have access to the latest software upgrades free of charge.

Over the last five years, large format technologies have developed exponentially. What was once regarded as an expensive, slow and niche printing technology is recognised as a sleek, accurate and efficient production process that is complementary to sheet-fed offset and digital. Large format represents a relatively modest capital investment, when compared to other print technologies, but the spectrum of products that can be produced with it is virtually unlimited.

Success in today's commercial marketplace relies on more than great technology and professional support. Printers need a partnership with a manufacturer that shares their passion for developing additional revenue streams and vision for business opportunities. With the right manufacturer as partner, large-format digital printing technology enables print companies to increase their product portfolios and profit margins, and retain ownership of jobs while using many of the skills that are already in-house. SP

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A SUSTAINABLE GRAPHIC DESIGN SUPPLY CHAIN APPROACH

Amnon Shalev suggests a holistic approach to reducing graphic design supply chain environmental impact focusing on wide format printing

FOR MORE THAN A DECADE, PRINT BUYERS AND GOVERNMENT BODIES HAVE BEEN ACTING TO IMPROVE SUPPLY CHAINS ASSOCIATED WITH PRINT PRODUCTION (SUCH AS PACKAGING, WIDE FORMAT AND PUBLICATIONS) WITH THE INTENTION OF REDUCING WASTE, IMPROVING RECYCLING AND SAVING ENERGY. INK, BEING A SUBSTANTIAL INGREDIENT IN THE GRAPHIC DESIGN SUPPLY CHAIN, HAS BEEN RECENTLY TARGETED BY THE INDUSTRY AND REGULATORY COMMITTEES IN ORDER TO REDUCE ITS ENVIRONMENTAL IMPACT ON THE PRINT-SHOP AND ON GLOBAL ECOLOGY.

With the introduction of environmentally-orientated inks by ink solution providers such as HP, EFI, Bordeaux Digital Printink and others, questions about the 'green level' (i.e. which product is 'greener'), productivity level (e.g. drying properties), adhesion, odour etc. have become a source of concern for print-shop owners, printer operators and consumables suppliers.

These questions are becoming more relevant as large print buyers demand more environmentally-friendly yet sustainable[I] print solutions. Despite the relevance, there are very few answers available.

REDUCING VOCS AND HAPS

In addition to the pressure from print buyers, EU and US regulatory committees are exerting their influence on manufacturers to reduce VOC (Volatile Organic Compounds) containing Hazardous Air Pollutants (HAPs) levels in ink products. New European regulations will also prevent the transportation of some of the currently used solvents. So the problem of using environmentally-unfriendly solutions is far more imminent than some of us might think and exceeds 'mere' environmental concerns.

The effect is expected to be felt on industry profits as early as this year. Regulation enforcement will most probably bring higher disposal costs, higher ventilation costs and regulated transportation costs, and ultimately result in discontinuing the use of certain HAP-containing solvents and heavy investment in resetting the operations.

Another important factor in the discussion is the concern expressed by print shop owners regarding the productivity level of green inks; some print shop owners are concerned that 'green' inks will not deliver the same quality and performance level as traditional solvent inks. This factor has already had an adverse effect on the market penetration rate of 'green' inks.

This article focuses on environmentally-orientated inks, being part of the materials supporting the graphic design supply chain, in the context of the inkjet large and super wide printing industry. Its main aim is to present a snapshot of the typical approaches and provide an accurate comparison of leading environment-friendly ink solutions. It offers industry players effective decision-making tools they can use when considering the 'green' aspect of ink production within their production workflow or supply chain considerations. It suggests a new holistic approach with a wider set of references, for the evaluation of super wide print inks as part of today's changing environmental consciousness.

AVAILABLE SOLUTIONS

Aqueous, bio, latex and UV-curable inks are considered the most environmentally-friendly inks with less VOCs and easier disposal. However there are a few issues worth mentioning here:

1. Aqueous inks are not compatible with all printing techniques or with some of the applications that the wide format industry is targeting. These inks are less durable in terms of outdoor conditions and can be applied onto a limited media range. Despite the 'fume-free' nature, even water-based inks are defined as 'irritants' and therefore cannot qualify as completely 'green' (at least when it comes to printer operator safety). In general, though, currently these inks are the closest to being 'green'.
2. Latex ink, introduced recently by HP, is yet to prove itself as a heavy production solution. This ink is provided as part of a wider environmentally-friendly solution including recycled media range.
3. UV-curable inks produce no waste and interact with a wide range of media. These inks contain no VOCs and so may be considered environmentally friendly, but UV-curable inks also have other safety issues associated with exposure levels to operators.

The author

4. Eco, Mild and Light Solvent inks: although being less aggressive, containing less aggressive solvents than traditional solvent inks, these inks still contain VOCs and HAPs.

Since full solvent inks provide a highly productive (being fast drying) and very durable solution, it seems that only by replacing the solvent with a HAP-free solvent that is equivalent in performance, we will maintain true solvent properties yet reduce environmental impact.

To achieve this there are two main approaches which reduce environmental hazards and eliminate harmful VOCs and HAPs. These approaches suggest basing ink formulations on one of these alternatives:

- Renewable sources based inks: Bio solvent
- Organic[II] derivatives based inks: HAP-free organic solvent.

We will compare Bio solvent inks with HAP-free organic solvent inks in order to identify important and relevant facts that may help us better understand the full meaning of 'green' and how it relates to the two product families.

RENEWABLE SOURCE-BASED INKS

Some ink suppliers have developed solutions made from renewable sources rather than traditional chemical solvents (e.g. EFI's BioVu inks). These inks are claimed to provide UV,

scratch and alcohol resistance and to have less odour than traditional solvent-based inks. They are mostly made out of corn, cotton and wood pulp, and 80-85 per cent of the ink is renewable.

The solvent replacement ingredient produced from renewable resources is ethyl lactate, which is a monobasic ester formed from lactic acid and ethanol, commonly used as a solvent. This compound is considered biodegradable and can be used as a water-rinseable degreaser. Ethyl lactate is found naturally in very small quantities in a wide variety of foods and has a mild odour. Due to its relatively low toxicity, it is commonly used in pharmaceutical preparations, food additives and fragrances. It is also used as a solvent for nitrocellulose, cellulose acetate and cellulose ethers.

Considering ethyl lactate as a safe, even edible solvent might be justified only in extremely low quantities. Once integrated at substantial percentages in ink solutions, it may become hazardous. We may want to consider this solvent's MSDS (Material and Safety Data Sheet) CAS Number 97-64-3 where it states:

- "Inhalation: may cause irritation to the respiratory tract. Inhalation of higher vapour concentrations may produce central nervous system depression."
- "Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposure as low as possible."
- "Flash Point: 46C (115F) CC"
- "Handling and Storage: Store in a cool, dry well-ventilated location".

To conclude, bio solvent inks contain HAPs-free solvent which should reduce costs associated with recycling and workspace ventilation and safety setup. Labelling shows they are by no means hazard-free. They are durable since they use the same pigments as solvent inks, however they may not accommodate a range of special substrates as wide as full solvent inks. The colour gamut is satisfying.

ORGANIC DERIVATIVES BASED INKS

So if a solvent-based ingredient should be present after all, what other source could meet the demand for HAPs elimination? Another environmentally-orientated ink solution is based on organic[III] solvent substitute.

These ink solutions are based on organic derivatives, which constitute a replacement solution for problematic solvents. Organic derivatives technology originated with BASF. Each BASF organic derivative possesses a set of unique characteristics that determines the product's performance and effectiveness and is designed to respond to individual challenges, including components in ink and coating formulations.

Bordeaux Digital Printink introduced the Prime Green inks family in 2007. Prime Green is an organic derivative ink designed to spearhead the industry's effort to face the challenges presented by rising government and private sector environmental consciousness. This organic product offers the following benefits:

- High productivity properties (fast drying)
- Adhesion to a wide substrate range
- High durability
- Virtually HAP and Cyclohexanone[IV] free
- Limited ventilation needed
- Non transportation regulated
- Wide colour gamut
- High recyclability, which refers to the waste factor in the workplace, as well as the ink's recyclability as part of the finished product.
- The same biodegradability level as bio solvent inks.

To conclude, in comparison to full solvent inks, organic derivative-based inks bear at least the same or better performance properties of traditional solvent-based inks in terms of productivity and durability, whilst being far friendlier to the operator and to the environment. These inks dry fast, emit very low odour and require limited workspace safety setup.

Some green ink samples

COMPOUND COMPARISON

Since the performance level of UV-curable, aqueous and eco inks is quite acceptable and known, we compared Bio and HAP-free organic solvent ink solutions. Both are relatively new to the market and each claims to provide a 'greener' option.

In terms of methodology, we compared the hazard and risk phrases which appear on the product labels. These phrases attest to the compounds' levels of operator safety and environmental friendliness. The products chosen were two of the leading solutions in the market: a common Bio ink and Bordeaux Digital Printink's Prime Green PgNr ink.

Bio ink	PgNr inks
Xn; Xi; flammable.	Xi
R10, R37/38 R22, R41	R41, R37/38
S15; S24/25; S26; S37; S39	S24/25; S26; S39

Some of the hazard and risk phrases appearing on the product labels appear only on the bio solvent ink product labelling:

- Xn = Harmful, chemicals that may cause damage to health.
- R10 (flammable): this risk phrase does not appear on the bio solvent label although the word "flammable" appears in the label body text.
- R22 = Harmful if swallowed.
- S15 = Keep away from heat.
- S37 = Wear suitable gloves.

Other warning phrases appear on the labels of both ink solutions[V]:

- Xi irritant = Chemicals that may cause inflammation to the skin or other mucous membranes.
- R41 = Risk of serious damage to eyes.
- S24/25 = Avoid contact with skin and eyes.
- S26 = In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S39 = Wear eye / face protection.

To conclude, of the two inks compared, based on their hazard and risk factors, bio solvent-based ink represents a higher risk than HAP-free organic solvent. The risk refers to the Personal Exposure Limit (PEL) affecting the operator, requiring ventilation and regulation for transportation. Both inks should be considered as chemicals bearing a certain degree of risk inside the print-shop space. Both inks provide the same biodegradability level, meaning that ultimately they are both equally recyclable.

Chart 1: The price of corn in the USA

ETHICAL CONCERNS OF 'GREEN' PRODUCTS

As we have shown, the evaluation of any 'green' ink focuses on four main criteria:

1. The source of the solvent replacement
2. Operator safety level
3. Productivity and quality
4. Bio degradability and recyclability.

While comparison of points 2, 3 and 4 shows that both 'green' ink solutions offer similar performance levels, the source of the solvent (1) becomes the real debate issue, namely which source is more environmentally-friendly. Bio solvent ink is mainly derived from corn.

Since the standards and specifications of labelling a product source as 'green' are quite blurred, we can only raise some important ethical issues which have recently surfaced as part of the global energy crisis:

- Food shortages in third world countries have risen considerably (as shown in Chart 1) due to crops being shifted to industrial purposes rather than feeding poor populations.
- Increases in food prices have resulted from the food crisis, in the Third World as well as in Western countries.
- Rain forests are being cut down to make space for soy, corn and other 'industrial' crops. This trend will continue as long as the prices for 'industrial' crops are higher than those for food crops.

OTHER ENVIRONMENTAL CONSIDERATIONS

Inks are just one part of a complete printing supply chain solution. To see the full picture in terms of the changing nature of inks versus ecological awareness, there are a few other important parameters to be considered.

It should be noted that the increasing market share of digital printing has a positive effect on some of the environmental issues associated with aggressive solvents, but might create new environmental issues associated with different digital printing technologies (e.g. electrophotography, xerography and inkjet).

The ink may be very 'green' but the media might take generations to dissolve as waste, so how 'green' is the print-shop finished product?

In addition we should consider cheap labour used to grow 'industrial crops' and the long-term damage to poor communities who might lose land when shifting to growing these crops. Ultimately it is the entire product, not just the ink, which will be recycled. The rest of the materials associated with the finished product are crucial in making the entire graphic design supply chain safer to the environment.

CONCLUSIONS

Both product families compared – Bio solvent ink and HAP-free organic solvent ink – are chemicals and both product families present some level of hazard to the operator environment, although markedly smaller than that of traditional aggressive inks. Of the two, product labelling shows that the new HAP-free organic solvent ink is less hazardous to the operator environment.

The environmental friendliness of a product is a complex issue that contains physical, commercial, social and ethical concerns. It is by no means clear-cut and therefore requires in-depth contemplation as part of any decision-making process.

When considering the environmental impact of printing processes, a wider perspective is suggested to evaluate a sustainable graphic design supply chain approach, which is the application of sustainability principles to graphic design. It considers the environmental impacts of graphic design products (including packaging, consumables, substrates etc.) throughout a product life-cycle that includes raw material, transformation, manufacturing, transportation, use and disposal.

When subjecting a design to a sustainability audit, apart from printing with low-VOCs inks, a designer may want to consider the following:

- Reducing the amount of materials required for production
- Using paper and materials made with recycled post-consumer waste
- What production methods require the least amount of transport
- Which vendors use renewable energy
- Whether the product can fulfil more than one purpose
- Whether the end-product is biodegradable or recyclable
- Whether the end-product can be replaced by a digital, rather than printed, format
- Just-in-time production to reduce the number of units produced and warehoused
- Which vendors sell products certified by third party NGOs (non-governmental organisations).

It is expected that all graphic arts supply chain players, including print buyers, graphic designers, printers etc. engaged in sustainable practice, will use techniques, processes and materials that will help reduce the detrimental environmental impact of their products or services. SP

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I The term, in its environmental usage, refers to the potential longevity of vital human ecological support systems, such as the planet's climatic system, systems of agriculture, industry, forestry, fisheries and the systems on which they depend (source: Wikipedia).

II The organic matter in soil derives from plants and animals. In a forest, for example, leaf litter and woody material falls to the forest floor (source: Wikipedia).

III Organic: An organic compound is any member of a large class of chemical compounds whose molecules contain carbon. An important subset of organic compounds is still extracted from natural sources because they would be far too expensive to be produced artificially. Examples include most sugars, some alkaloids and terpenoids, certain nutrients such as vitamin B12, and in general, those natural products with large or stereoisometrically complicated molecules which are present in reasonable concentrations in living organisms (source: Wikipedia)

IV Cyclohexanone is employed as an industrial solvent and as activator in oxidation reactions. It is also used in the production of adipic acid, cyclohexanone resins, caprolactam and nylon (source: Wikipedia)

V Bordeaux Digital Printink uses BASF made organic derivatives whose MSDS do not originally contain R36/37/38 directives (irritating to eyes, respiratory system and skin) or Risk Phrases (only R41). MSDS of some other producers of the same organic derivatives does contain these risk phrases. Despite BASF labelling, Bordeaux adds R37/38.

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DO YOU REALLY NEED TO OVERLAMINATE YOUR DIGITAL PRINTS?

Max Linder outlines the technical principles that are important for achieving the best results when overlaminating printed graphics

LAMINATION IS OFTEN CONSIDERED TO BE AN ADDITIONAL COST RELATING TO GRAPHICS, HOWEVER IT IS ALSO BENEFICIAL.

EFFECT

Overlaminates are frequently required to apply the finishing touch to images. Textured laminates provide more depth to images and make the prints more pleasant to touch, something that is particularly advantageous for promotional material handed out to customers at exhibitions, for example.

Gloss laminates sharpen the colours and contrast and give the illusion of a higher gloss print. This is often required for the promotion of luxury products or special events, such as Christmas-related promotions. Special films such as MACtac's Permacolor Permafun Crystal Gloss also deliver a glittering effect, which will add style and attract attention.

Matt softens colours and contrasts whilst also hiding imperfections and minimising the glare of in-store lighting. These special effects enable printers to adjust to the needs of their customers and in turn add value to promotional graphics.

PROTECTION

With regard to medium / long-term applications, specific overlaminates help to protect graphics against UV rays, an important feature even in countries that have a limited number of days of sunshine per year. Colour fading is a real problem as it damages graphics and adversely affects the brand image of the promoted product. While a certain level of protection is delivered by the film itself, the main protection factor is guaranteed by a special adhesive formulation with a built-in protection.

Lab tests have proven image durability to be directly linked to the UV stabilisers and absorbers 'integrated' in the film or in the adhesive / layer. While UV stabilisers prevent the loss of plasticity and clarity as well as brittle or yellowing effects, UV absorbers play a supplemental role in preventing the image from colour-fading due to UV radiations. Ageing tests and field experience have demonstrated that the lifetime of an image protected with a self-adhesive overlaminate with UV absorbers can be extended significantly, representing a considerable benefit for promotional applications.

Overlaminates are also required to combat mechanical stress, abrasion, smoke effects, moisture, volatile agents and above all the 'tags' and graffiti culture that continue to appear in our cities and public transport. Although it is now accepted that it is almost impossible to prevent graffiti makers, the development of special films has ensured that graffiti removal is now much easier and less expensive than having to apply one or two layers of paint on vandalised vehicles, building facades and public infrastructure.

Overlaminates help to protect against vandalism and in turn ensure that the brand image remains intact

Proven slip resistance and traffic intensity should be considered when choosing protective films for floor graphics

FLOOR GRAPHIC TRIMMING

Due to the thickness of the Permaflex protective film and the force required to trim laminated photo images (film or paper), some stress of the product has been occasionally noticed along the trimmed edges. This can result in a slight separation.

MACtac has developed a simple technique to help eliminate the potential for separation. This separation, which can sometimes be seen with varying degrees of severity, is influenced by such conditions as dull blades, thick blades, fresh lamination, as well as the trimming of laminate on a soft cutting surface.

MACtac has found that by using 45° angle cuts, as illustrated in figures 2 and 3, excellent results will be achieved. The direction of the angle chosen depends on the appearance desired. To optimise this procedure, it is recommended that sharp blades are used and, whenever possible, the laminate bond should be allowed to build (for a period of 24 hours) prior to cutting.

Figure 1

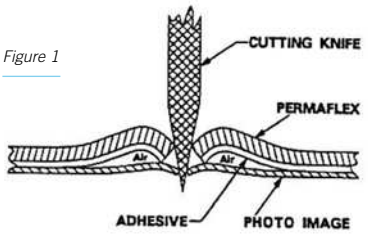


Figure 2

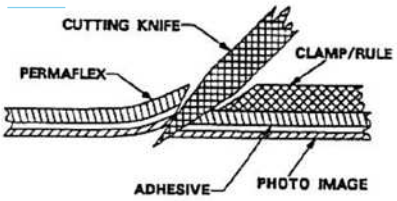
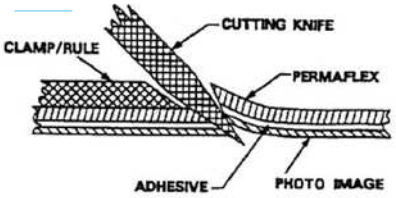


Figure 3



APPLICATION

Lamination can also provide a print with more rigidity, in turn making application easier. This is particularly useful for large decals that are applied on flat surfaces, such as the sides of buses or hoardings.

THE RULES

A critical aspect in achieving successful lamination lies in ensuring that the print is totally dry. Drying before laminating is essential or the solvents will remain trapped and continue to attack the media, in turn

When the protective film and the printing substrate are not 'like with like' products, tunnelling and delaminating usually appear

causing the delamination of the laminate or adhesion problems to the substrate. While this sounds like common sense, inadequate drying of prints remains prevalent in the industry. As printers strive to meet customer demands, the pressure to achieve faster output is compromising correct conversion procedures. One of the biggest causes of print failures comes from incorrect drying.

The other aspect ensuring successful laminating is using 'like with like' products – monomerics with monomerics, polymerics with polymerics etc. Naturally, there are exceptions to this rule – for example, polyesters can be used to laminate PVC. The problem is that different products expand and shrink at different rates.

The adhesive is like a fluid layer, in between which there is the possibility for movement. If one layer moves differently you can experience such problems as delamination or tunnelling. Ideally you should use the same brand of product and follow the recommendations provided by the supplier to ensure compatibility and so that your film warranties remain valid.

Through following these basic steps in the selection and conversion process you can eliminate any unnecessary risks.

THE SPECIAL CASE OF FLOOR GRAPHICS

Image protection is particularly important for floor graphics, especially given the fact that safety is critical for this application. Considerable attention should be paid to slip resistance and all floor graphics protective films must have passed the ASTM D-2047-93 test (the "Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces").

To avoid the eventual lifting of the floor graphics assembly, it is recommended that the corners be rounded off. If for design reasons the corners cannot be rounded off, eventually an edge-sealer can be used to increase the mechanical resistance of the assembly. If the wrong self-adhesive construction has been chosen, you should ensure that any graphics that have become worn out, are peeling, lifting or chipping at the edges are removed and replaced to avoid the risk of personal injury.

The right overlaminate also needs to be chosen to cope with traffic intensity, which can vary greatly. For example, short-term promotional floor graphics in a supermarket are a much less demanding application than the medium / long-term directional signs that are applied on the floor of an international airport. It is for this reason that textured films of different resistance and different prices have been developed. Options include clear matt polypropylene, PVC and highly resistant polycarbonate. By choosing the right construction, converters will avoid risks and save money. SP

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DIGITAL TECHNOLOGIES AND THE APPAREL DECORATOR

In the first part of his article, Johnny Shell outlines the digital technology available for the apparel decorator wishing to upgrade

WE SEE EVIDENCE EVERYWHERE OF DIGITAL TECHNOLOGY AS SHOWN BY THE TECHNOLOGICAL DEVELOPMENTS IN OUR INDUSTRY OVER THE PAST DECADE. THE ADOPTION RATE OF DIGITAL PRINTING AND IMAGING IS VERY STRONG, BUT IF YOUR SHOP HAS NOT YET INTEGRATED DIGITAL, THIS ARTICLE OFFERS VARIOUS DIGITAL TECHNOLOGY CHOICES THAT ARE AVAILABLE TO THE APPAREL DECORATOR.

WHY INTEGRATE DIGITAL TECHNOLOGY?

Why would a business consider integrating digital technology? Many of the popular decorating methods such as screen printing and embroidery are time-tested choices for the apparel market. However, markets inevitably change, and fashion trends and consumer tastes change rapidly as well. What's 'hot' today is old news tomorrow. People in today's culture thrive on expressing their individuality – the days when it was common to see a 'swoosh' mark, maple leaf or alligator on someone's chest are nearly gone. Distinctiveness rules in the current social environment, and people want something that no-one else has.

Average run lengths are also dropping as the big-box stores relocate high-volume work into shops with lower production and labour costs. In today's market, the public wants it now, if not sooner. A quick order turnaround is the standard, not an exception, with today's customer.

By taking these facts into consideration, many apparel decorators are staking their claim in new vertical markets and making notably higher margins as a result of mass-customisation, something digital technology all too easily facilitates. Accommodating the short run is what digital does best – it can handle a one-piece order easily and cost-effectively. Asking for a run length of one piece at a reasonable cost in a screen or embroidery shop is similar to asking for the impossible. The associated costs and use of resources is not worth the investment unless a company charges a substantial price.

Figure 1: Desktop Epson inkjet printers are widely used for inkjet transfers; systems are also available that print both inkjet and dye-sublimation transfers

PRIOR TO JUMPING IN

Before integrating digital, there are some important points to understand. Digital printing technology and its developments never stand still; platforms change rapidly and little time will pass between the time you buy into a solution and the subsequent introduction of new models and features.

State-of-the-art is short-lived with digital and the adage about the personal computer, "it's usually out-of-date by the time you get it home", is true here. While digital printing technology doesn't move quite that fast, it isn't far behind. Picking a reliable system initially ensures you won't have to upgrade every time a new model is released. Reliability can mean a system that lasts two to three generations of model upgrades before new features require you to upgrade.

You will need to upgrade eventually. Equipment can last several years without any problems, but as technology evolves, print speeds, finer resolutions and cheaper print costs evolve as well. This will make the old reliable system appear to be a Model T Ford in an age of flying cars.

Another important concept to think about is creating multiple lives for the technology(s) you integrate. Considering lifespan and staying on the cutting edge, you may consider choosing a solution with the ability to decorate things other than apparel. Several of the technologies discussed here have the ability to decorate multiple product types. Custom apparel is a big market, but offering additional products will ultimately mean additional market share and an expanded customer base.

INKJET TRANSFERS

Digital apparel decoration methods take on many forms and some of the simplest include inkjet and laser transfer technologies, which are relatively easy to use and understand. They are also perfect for small quantities and are fairly inexpensive when compared with alternative decoration methods in which photo-realistic images are required.

Personalisation is easily accomplished from any graphic application typically used in the industry (e.g. Photoshop, Illustrator etc.). When high quality paper and ink are used and the transfer is applied correctly, the image will last a long time. Early transfer technology suffered because of poor wash-fastness and image durability, however advancements in paper, coatings and ink make today's inkjet and laser transfers a viable option for low-quantity, photo-realistic images.

Inkjet transfers can be produced using aqueous dye-based printers as well as solvent and eco-solvent systems. Amongst the popular choices in aqueous systems are Epson (see Figure 1), Canon and HP while choices in solvent and eco-solvent systems include Roland, Mimaki and Mutoh. Available widths range from 21.59 cm (8.5 inches) desktop models to 2.64 m (104 inches) wide-format inkjet devices.

TRANSFER PAPER

Inkjet transfer paper is specially coated with two layers applied to the paper. Firstly, a polymer is applied that is designed to split from the paper to carry the ink to the garment. The second coating is an ink-receptive layer that captures the ink when it is jetted. The design is printed in mirror-image mode and the transfer is applied to the garment using a heat press. The heat causes the coating to release from the paper and bond with the shirt, essentially trapping ink between the coating and the garment's fibres.

The durability of an inkjet transfer is considered to be average, but largely depends upon the quality of the paper and ink formulation used. Paper sizes are available in a wide variety and include 21.5 x 28 cm (8.5 x 11 inches), 28 x 43 cm (11 x 17 inches) and 33 x 48 cm (13 x 19 inches). When an economy-grade paper is used, image quality can degrade after only a few laundry cycles. Premium grade papers offer optimum coating passes and base sheet material to produce a quality transfer image; however, they come at a higher price. Economy papers will offer lower prices, but transferred images will not have the longevity and durability associated with premium papers.

Premium papers typically hover between 50-75 US cents per sheet, whereas economical papers are lower at roughly 10 US cents per sheet. Don't buy on price unless image quality and durability aren't a concern. Although most OEM dye-based inks will

suffice for inkjet transfers, specially formulated dye-based transfer ink improves image durability and is designed to withstand colour degradation caused by the heat press, and will resist fading caused by laundering.

TRIMMING THE TRANSFER

Inkjet transfer users are also tasked with the additional step of trimming the transfer once printed. Trimming ultimately reduces the amount of coating that is transferred to the garment. If you have a 21.5 x 28 cm (8.5 x 11 inches) page size with an image that covers roughly 75 per cent of the page, for instance, if you put the entire page into the heat press, the coating will transfer even in areas where ink wasn't printed, which will leave a transparent frame equal in size to the perimeter of the page (see Figure 2, right image).

Trimming around the printed image by hand reduces the clear window effect, but will leave a small amount surrounding the image. Some shops use vinyl cutters to trim around the image, which eliminates the clear window effect associated with hand-trimming. These units can remove any inner areas of the design where hand trimming can be difficult.

Inkjet transfer will work on cotton, cotton / poly blends and polyester garments, so the majority of fabric blends can be decorated using this technology. When transferring, the heat press is typically set to 149-190 °C (300-375 °F) for 10 to 15 seconds. As with screen printing, dye migration is still possible when transferring to polyester and polyester blends. Special papers are available for solvent ink systems that inhibit dye migration and should be a consideration if decorating these fabric types.

SHOPPING FOR SUPPLIES

A basic shopping list for equipment and supplies includes:

- an inkjet printer (US $49-2000 / €36.5-1500)
- a heat press (US $500-2000 / €374-1500)
- transfer paper (US 40-75 cents per standard letter size sheet)
- ink (US 5-75 cents per transfer).

As mentioned, OEM ink can be used for inkjet transfers but it is more expensive than specially formulated transfer inks. The 11 to 13 mL (.37 to .43 fluid ounce) OEM ink cartridge is approximately US $12 (€9), or roughly US $48 (€36) per set of four inks. Inkjet transfer ink typically costs US $40 (€30) for 110 mL (3.7 fluid ounces) of ink, or US $160 (€120) for a set of four inks. The cost difference is significant when you consider that 1 mL (less than 1 fluid ounce) of ink will usually cover 1 square foot.

The use of inkjet transfers provides the ability to reduce inventories, maintain a relatively inexpensive cost per transfer and reduce the lead time required prior to printing. Some disadvantages include the need for trimming, the resultant 'hand' that is produced, the image's durability when compared with other techniques and the clear window that appears when there is insufficient trimming. Additionally, extra materials must be used when decorating dark garments (see the section on print-and-cut media in the second part of this article).

LASER TRANSFERS

Laser transfers are similar in production nature to inkjet transfers but they can be produced at a much faster rate. This technology is perfect for low quantities, personalisation, add-on graphics and logos or any application where photo-realistic images are needed. Laser transfers are often used in mall kiosks, fairs, flea markets and tourist destinations, and for promotional products.

To produce laser transfers, one must incorporate either a laser printer or copier using standard toner and special laser transfer paper. The technology, properly termed 'electrophotography', uses static electricity to generate a printed image. These devices effectively write the image to a photoconductive drum by neutralising the static charge in certain areas. The charged areas of the drum attract the dry toner, which is then fused to the paper as it passes through a pair of heated rollers, melting the toner powder and bonding it to the transfer paper, which is coated with special polymers designed for dry toner applications.

Using a heat press, the printed transfer is pressed to the garment at 190-204 °C (375-400 °F) for 10 to 30 seconds. The heat causes the coating to split from the paper, trapping the toner between it and the garment's fibres. As with inkjet transfers, using poor quality laser transfer paper will cause images to deteriorate after only a few laundry cycles. Here, too, the type and number of coatings, as well as the base sheet material, will dictate image quality and durability. For optimum results, use only premium papers.

Laser devices come in many specifications, but industrial models are almost infinitely adjustable in both speed and heat settings so that the device is easily dialled to meet the requirements of the paper being used. Economical laser devices costing less than US $300 (€224) will experience problems because of the internal heat settings, which are often too high for laser transfer paper.

DESKTOP DEVICES

Desktop laser devices are usually found in either letter or legal formats for a nominal price. However, when format requirements exceed these sizes, there is a considerable price jump for larger-format machines that can output up to 33 x 48 cm (13 x 19 inches) pages.

The 'hand' of the print can vary, but most laser transfer images have a synthetic plastic feel caused by the polymer coating that transfers along with the toner, although there are continued advances in coating technology that have improved this aspect. Also, as with inkjet transfer, trimming is required with some papers.

Newer papers available have special coating chemistries that only release from the paper where toner has been applied, thus greatly reducing or eliminating the clear window effect. Solutions such as these are providing a way to decorate dark garments with laser transfers. However, the process involves a multi-step procedure whereby a white base is incorporated to provide the necessary opacity on dark fabric.

PRINTER COSTS

Laser transfer will work on cotton, cotton / poly blends and polyester garments, but dye migration can be an issue. A basic shopping list for laser equipment and supplies will include a laser copier or printer. A desktop laser printer cost ranges from US $500 to $10,000 (€373-7500). A high-end laser copier may have a larger price range (US $1500-150,000 / €1120-111,890) because of the increased speed capabilities and adjustment possibilities offered as well as

Figure 2: The 'clear window' on the right is a downside to inkjet transfer; on the left, newer papers eliminate the clear window

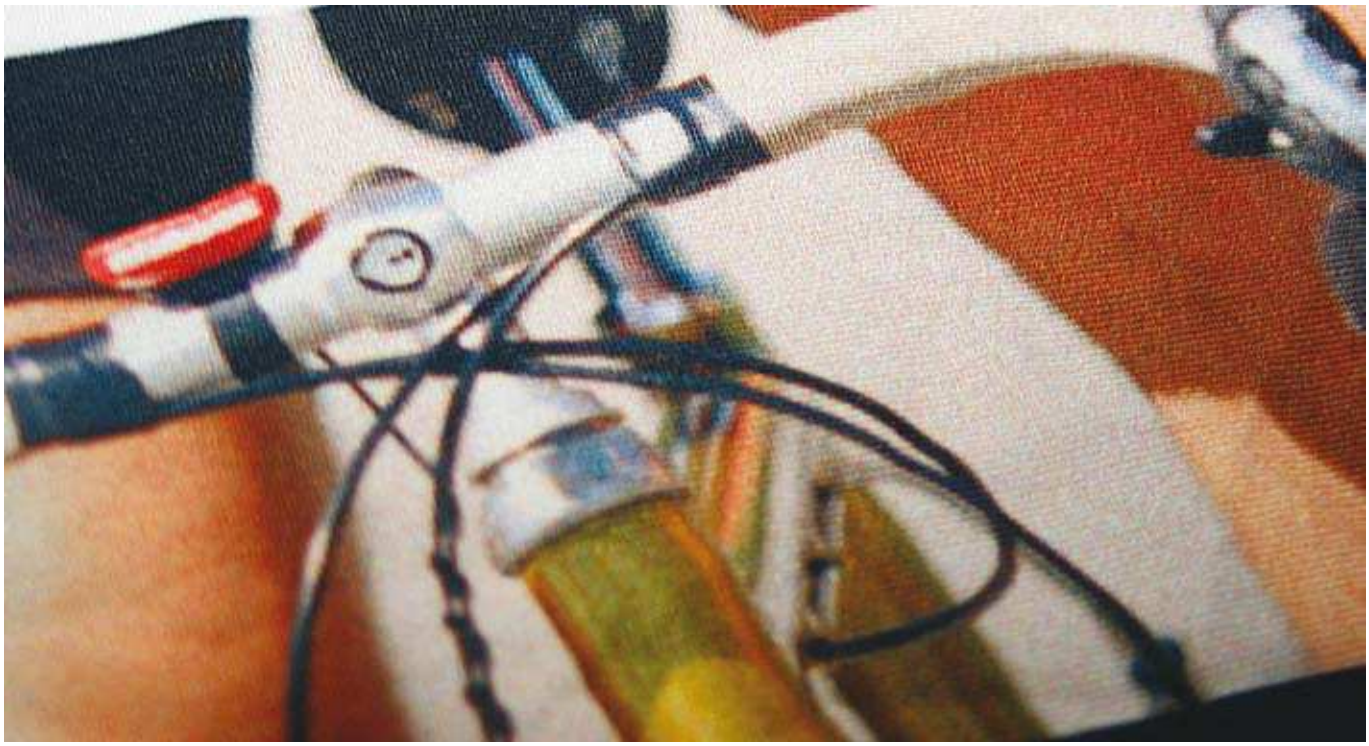

Figure 3: The vibrant, full-colour photographic image shows the benefit of dye sublimation transfer

the technological elements of high-end equipment. A heat press (US $500-3000 / €373-2240), transfer paper (30 US cents to US $1 per standard letter sheet for light garments; 60 cents to $1.50 per standard letter sheet for dark garments) and toner (2-25 US cents per transfer) also are needed.

Laser transfers can be printed extremely quickly and provide the ability to reduce inventories. They are relatively inexpensive per transfer and do not require a huge lead time prior to printing a transfer. The same equipment can be used for light and dark shirt transfers (only the paper changes).

While technological advances continue to improve laser transfers, some disadvantages include the need for trimming, the 'hand' produced, image durability when compared with other techniques and the clear window caused by insufficient trimming.

Here are some key points to remember when considering inkjet and laser transfer technology:

- Inkjet equipment is a relatively small investment whereas laser has a higher initial investment cost
- Inkjet is slightly higher in overall cost per transfer when compared with laser
- Both produce vibrant colour and photorealism
- When examining speed attributes, laser technology will print up to 60 pages per minute or more compared with inkjet, which is much slower.

DYE SUBLIMATION

Dye sublimation transfers use a desktop or wide-format inkjet printer primed with dye sublimation ink. When transferred, the ink becomes a permanent part of the garment. However, the user is limited to garments made of at least 65 per cent polyester. More vibrant colour is achieved as the polyester content in the fabric blend increases. The finished transfer has virtually no 'hand'

and the image durability is excellent. The technology is ideal for high-margin customisation, certain sporting uniforms or jerseys, performance apparel or any application where photo-realistic images are needed and durability is a top priority.

Dye sublimation is not limited to decorating garments; many products such as ceramic tile, mouse pads, mugs and plates can be decorated using practically the same equipment, so generating multiple lives for dye sublimation is quite easy.

There are two important factors that make dye sublimation a special technique. When high temperature is applied, it causes the dye sublimation ink to change from a solid to a gas without passing through a liquid state. Simultaneously, when heat is applied, the polyester molecules in the fabric open to receive the gaseous dye. When the heat is removed the polyester molecules close, resulting in a dyed polyester fibre with no 'hand' on the surface.

FORTHCOMING DEVELOPMENTS

The technology works primarily on polyester and special polyester coatings applied to the surface of an object, but there are forthcoming developments for dye sublimation transfers to cotton fabric. If you have experienced dye migration when screen printing polyester garments, dye sublimation is similar to when a red polyester garment reaches a temperature high enough to open the molecules to release the dye right into your nicely printed white ink.

Dye sublimation will produce fantastic colour on white and light-coloured fabrics, so if colour is critical, this is one of your best choices (see Figure 3). Unfortunately if you want colour on a black fabric, you need to start with a white fabric and dye-sublimate it black. For those designs in which colour isn't critical, dye sublimation provides unusual and acceptable results on darker fabrics (see Figure 4).

Dye sublimation transfer paper has a coating that is designed to hold the ink until it sublimates to the fabric. Because dye sublimation is very diverse in the applicable product range, there are two types of dye sublimation transfer papers: cellulose and clay-based. Each is appropriate in certain instances. Different papers work best with their specific application, so it's important to consult with your supplier when choosing a paper for open-substrate (textile) or closed-substrate (ceramic, metal) materials. Dye sublimation ink can be formulated in an aqueous, solvent or oil-based carrier. Most decorated apparel shops use aqueous systems.

Heat press parameters for dye sublimation are usually set between 196-218 °C (385-425 °F) for 35 to 55 seconds on textile substrates, and up to 15 minutes for hard substrates such as ceramic tile. When shopping for a heat press for use with dye sublimation, make sure it will reach the desired temperature to ensure a quality transfer.

SHOPPING LIST

The shopping list for dye sublimation equipment and supplies includes:

- an inkjet printer (US $49-4000 / €36-3000 per desktop model; US $2500-65,000 / €1868-48,550 per wide-format) that is primed with dye sublimation ink
- a heat press (US $600-125,000 / €450-93,364) that is able to reach 204 °C (400 °F)
- dye sublimation transfer paper (30 US cents to US $1 per standard letter sheet)
- ink (25 US cents to US $1 or more per transfer).

As indicated previously, dye sublimation offers excellent durability, image detail and colour vibrancy. The finished print has no 'hand', which makes the feel second to none. The technology is well-suited for popular newer trends in urban fashion and performance / wicking fabric markets. Additionally, dye sublimation offers the potential for product diversity that can benefit a company as all of its business will not be in one product type.

The drawbacks of dye sublimation include the higher cost of inks and a limited, more expensive apparel choice. Nevertheless, niche markets that match technology with need do exist, and some offer a handsome return. For example, outdoor work crews (construction, landscaping etc.) are benefiting from wicking fabrics by staying dryer, cooler and are more productive than when wearing a hydrophilic cotton shirt, which absorbs perspiration and becomes heavier.

One final difficulty some dye sublimation users experience is colour reproduction and predictability which can be a challenge without the proper knowledge, use and understanding of colour management, ICC profiles and device calibration. Once these management systems are incorporated and used, dye sublimation is a top contender for colour vibrancy, durability and image detail. Newer urban fashion trends use dye sublimation and are generating a new wave in fashion apparel. SP

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The second part of this article will appear in the next issue of Specialist Printing; to make sure you receive a copy, subscribe at www.specialistprinting.com

Pictures courtesy of The Paper Ranch, Oklahoma City (OK), USA.

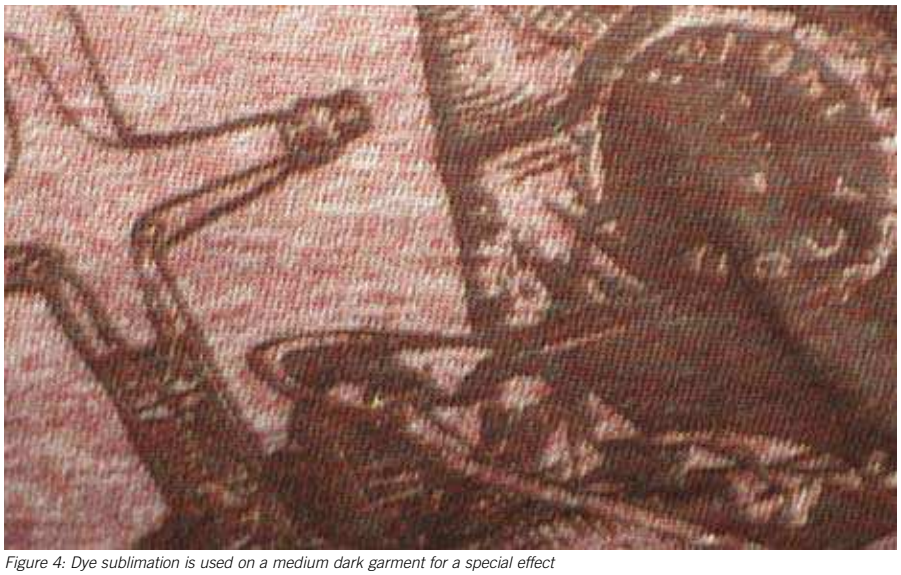

Figure 4: Dye sublimation is used on a medium dark garment for a special effect

SGIA GUIDE TO GARMENT DECORATION

Price: $16.95 for SGIA members / $24.95 non-members

This new guidebook provides a comprehensive review of the current digital technologies and processes available to the garment decorators, including:

- An industry review with highlights of markets served
- Digital file management
- Colour management
- List of direct-to-garment inkjet technologies

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THE POTENTIAL OF DIGITAL PRINT IN THE PACKAGING SECTOR

Peter Addington describes the development of a new printhead for use with industrial digital printing

LIKE SO MANY AREAS OF COMMUNICATION TECHNOLOGY, INDUSTRIAL PRINTING IS BEGINNING TO MOVE FROM ANALOGUE TO DIGITAL – AND OF COURSE, HOME AND SMALL OFFICE PRINTING HAS BEEN DIGITAL FOR A NUMBER OF YEARS. TO QUOTE THE UK MAGAZINE *CONVERTING TODAY* (OCT 2004): "THE FUTURE IS DIGITAL BECAUSE OF INEVITABILITY AND PROGRESS, AND THE IMPACT ON THE (PACKAGING) INDUSTRY WILL BE TO INVENT THINGS THAT COULDN'T BE DONE BEFORE".

This transition to digital is beginning to be seen in the packaging industry. Toner-based systems such as HP Indigo and Xeikon have been available for a number of years and in the last two years a number of significant drop-on-demand inkjet printing projects have been getting underway. More are planned later this year and product launches are anticipated at forthcoming major trade exhibitions.

So why is inkjet printing being considered, and what are the real benefits?

PACKAGING INDUSTRY BACKGROUND

The packaging industry is seen as dynamic – driven by consumer trends and retailer demands and, as such, changing rapidly. Research organisation Pira International outlines the market drivers affecting innovations in package design as the shorter life-cycle of products, a desire for greater product differentiation, more frequent design changes, customisation and versioning, a wider range of substrates, shorter print runs, cost reduction and supply chain restructuring.

Attitudes to packaging are also changing: it is no longer just taken for granted, we are now concerned about 'sustainability' in packaging and keen to recycle as much as we can. Lightweighting, down-gauging and mono-material packs are critically important parts of packaging technology. Corporate Social Responsibility (CSR) impacts upon the role of packaging and retailers all have their ideas on own-brands, packaging and supply chain structure.

All of these drivers, as well as demanding design innovation, enhance the attraction of digital print and support the introduction and use of drop-on-demand inkjet technology. Not only is digital print growing significantly faster than any other print process, but gravure, which is ideally suited for long print runs with minimal changes, is in relative decline.

WHY IS DIGITAL PRINT BEING CONSIDERED?

Typically there are a number of marketing issues that appear to be best addressed by digital print, including product personalisation, global brands but local languages, and legislative print requirements. There is also growing discontent with the traditional print supply chain that can result in long lead-times determined by printing plate or cylinder production, mass production, high stocks and high wastage and write-offs.

Plus, of course, traditional print does not cater for the current need for rapid change which demands 'just-in-time' solutions and economic methods of handling short print runs with both acceptable production efficiencies and levels of non-productive down-time.

THE BENEFITS OF DIGITAL PRINT

The benefits of digital print enable us to "invent things that couldn't be done before". Amongst the most important are:

- 100% continuity in workflow with little or

A Caslon label reel printed using the Nilpeter printer with Xaar 1001 printheads

The Jetrion label printer

The Xaar 1001 printhead

no time lost between print jobs
- With suitable software it offers variable data printing on demand
- There are no films, screens, plates or rollers to make, process or clean, hence:
  - Reduced pre-press costs
  - Reduced waste and environmental impact
  - Simple copy change
- Print dimension independence as repeat-length is not dependent on cylinder circumference
- The ability to handle short run lengths efficiently facilitates:
  - Swift reaction to market opportunities
  - Faster order turnaround
  - Significantly reduced inventory
  - Reduced wastage.

INKJET VERSUS TONER

As toner-based print systems have been available for a number of years, it is worthwhile to compare the two methods of digital package printing.

According to the Pira International Report *'Digital Print for Packaging: a Market Penetration Assessment 2006'*, toner-based systems accounted for half the market in 2005 but growth will be greater for inkjet because there is:

- Greater scope to reduce costs and improve efficiency
- Potential for greater print-width with inkjet
- A restricted choice of substrates with toner systems
- Greater potential for printing rigid packaging
- A greater number of companies in the inkjet market
- Greater potential to work with new technologies such as RFID and nanotechnology.

These advantages have led to a number of 'early adopters' within the package printing arena. Label printers, unsurprisingly, are the most common with machines available from EFI, Nilpeter, Sun Chemical, Stork, Impika and others. G-Mat, a UK-based engineering company, has built a plastic cap printing machine and has recently announced the launch of a pharmaceutical blister pack printer.

There have, however, been ongoing concerns about the characteristics of drop-on-demand inkjet print heads. These were identified in the Pira report and are specifically:

- The quality of print which was considered to fall short of that achievable with toner print systems
- The speed of printing, which has always been slower than continuous inkjet
- System reliability as all inkjet systems, including thermal desk top printers, need a regular 'purge and clean' or maintenance cycle
- Cost of print.

Xaar set out a development programme some years ago for a totally new printhead design which addressed all of these concerns and was suitable for single pass printing in production line environments. The printhead that emerged from the development programme was the Xaar 1001, launched last year.

A NEW PRINTHEAD

The Xaar 1001 printhead has been developed specifically for use in industries such as packaging, textiles, ceramics and printed electronics where the demands are for high throughput single pass printing with high quality print, reliability and efficiency of operation, long life and the ability to handle difficult fluids such as white or metallic inks.

The printhead design is for use in production line environments with a number of special features including simple electrical and ink supply connections, a nozzle guard to protect the nozzle plate and a patented 'Self-Alignment System' for easy installation. Xaar's variable drop (Greyscale) technology allows the deposition of variable size drops of ink, and TF Technology assists in print quality and delivers particularly high reliability and ease of use.

VARIABLE DROP TECHNOLOGY

Greyscale technology allows variable-size drops of ink to be placed accurately on the substrate. This is achieved by rapidly firing small droplets of ink which coalesce as they leave the nozzles. There are 1000 nozzles in two rows of 500, giving a native resolution of 360 dpi. Each droplet or sub-drop is 6 pl and the Xaar 1001 produces seven drop sizes from 6 to 42 pl.

The advantages of variable drop size are that it gives a much greater potential for colour matching, pin-sharp text and line work is achievable using the smaller drop sizes, and drop size variation allows printing on subtrates of different absorbency. The improvement in the quality of the print over that achievable with binary printheads, where the drop size is always the same, is significant – the native 360 dpi resolution appears as an 'effective resolution' of 1080 dpi to the human eye.

TF TECHNOLOGY

This is a significant departure from the traditional design of a piezoelectric printhead. All previous printhead designs, regardless of manufacturer, have ink entering at the back of the channels which then carry the ink to the nozzle at the front of the channel. A rapid deflection of the channel side walls (up to 120 kHz) creates an acoustic wave that travels down the channel and ejects a drop as it reaches the nozzle-plate.

With the Xaar 1001 printhead design the ink passes through the channels and washes past the back of the nozzles that are now positioned in the side of the channel rather than at the end. It then returns through an ink recirculation system where it can be filtered for the removal of air bubbles and contaminants such as dust particles. This creates a through-flow of ink that delivers high reliability.

As the ink is continuously recirculated, the ink temperature can be accurately controlled across the head and as ink viscosity is dependent upon temperature and viscosity determines drop size, the technology brings an improvement in print density consistency and hence print quality. The continual recirculation of the ink allows higher viscosity inks to be used than have previously been possible and heavier pigment loadings, as found in metallic inks, remain in suspension.

APPLICATIONS

Obvious applications are the printing of blister packs and cartons with variable data to cater for different product specifications, languages etc. This should minimise stock and allow run length optimisation. The machine developed for blister pack printing by G-Mat is off-line and is fed with blister packs that have been stored in magazines after lengthy production runs, which are then printed with a UV ink, cured and re-stacked in magazines ready for subsequent packing. Inkjet printing is non-contact and therefore substrate-independent, making it highly suitable for uneven surfaces such as Du Pont's Tyvek which is widely used in medical device packing.

There is no doubt that inkjet printing is moving into a new era. The Xaar 1001 TF Technology printhead is ideal for a wide range of production line printing applications across both the packaging sector and industries such as textiles and ceramics, where operational efficiency is critical. sp

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METALLIC SPECIAL EFFECTS

Edward Branigan looks at the properties of metallic inks and explains their use in the printing process

THE TREND IN METALLIC INKS AS A DECORATIVE ELEMENT FOR GARMENT DECORATORS SEEMS SET TO CONTINUE. AS THE INK MANUFACTURING TECHNOLOGY EVOLVES, SO THE APPLICATION POSSIBILITIES GROW TO THOSE WHO CAN USE A LITTLE CREATIVITY AND IMAGINATION.

Metallics were heavily represented on the apparel embellishments in all areas at February's recent MAGIC show in Las Vegas (USA). The use of metallics in graphics for garments is fashion-driven and a cursory glance through any major clothing retailer's apparel lines repeats the same story: soft hand variants coupled with all over graphic prints, with metallic adornments heavily represented.

What remains for designers and manufacturers to do is to educate themselves as to what types of products are available and optimise their positive characteristics for print applications.

PROPERTIES

Most plastisol metallic inks are comprised of two main components: metallic pigments and a liquid resin. The resin serves as the carrier for the pigment and protects it after curing. Typically gold metallic pigment is comprised of a mixture of copper and zinc pigment particles; these are mixed in various proportions according to the shade required. For silver pigment, aluminium particles are usually used.

After the raw materials have been obtained, they are processed into metallic pigments by being ground into fine particles using special mills. Because screen printing for garments is a low resolution application, a larger flake is used. This size range is 3-15 microns; the eventual size used is determined by the end user application (see Figures 1 and 2).

During processing, pigments are sometimes coated with lubricants such as stearic acid. This prevents cold welding and helps during the curing process by allowing the pigment particles to rise to the top of the ink film and to lay flat, thus allowing for more surface reflectivity. Uncoated pigments are also available but are less brilliant because they do not rise to the top of the ink film – they stay at the bottom, don't align easily and light has to penetrate the clear resin before it can reflect from the particles.

DESIGN

When designing for textile print graphics incorporating metallic inks, two important considerations need to be taken into account. The first is the size of the flake to be used, which determines the minimum line weight which can be used, which determines the

Figures 1 and 2: Because screen printing for garments is a low resolution application, a larger flake is used

Figure 2

mesh count to be used. For example, if the application is to be glitter and the micron size of the flake is .8, then the mesh needed for this application would be a 25 T or 60 cm (see Figure 1). The smallest line weight size that would be adequate for this application is a 1 pt line. This will be wide enough for the glitter flake to pass through and also wide enough for the larger-sized open areas of the mesh to hold.

The second consideration is machine configuration. Metallic inks cannot be printed wet on wet; either the ink is printed in the last station or a flash is used. If multiple metallic colours are required then multiple flashed are required. This will impact upon the availability of regular colours to the designer within a graphic to be used for a metallic application.

As mentioned earlier, screen printing is a low resolution application, especially on textiles, and this has had an effect on the type of metallic pigments that were applicable. Until recently the standard mesh count for a metallic application was 25-40 T (60-90 cm) for glitter and 86-110 T for shimmer metallics. Improvements in pigment processing and refining in recent years have led to the development of much smaller metallic particles which in turn allows a higher resolution to be used in the graphic. Mesh counts up to 230 T (560 cm) can now be used (see Figures 3 and 4).

Figures 3 and 4: Much smaller metallic particles now allow a higher resolution to be used in the graphic

COLOUR MATCHING

Most ink manufacturers offer a range of metallic colours, whether these are jewel tone or regular metallic. A colour concentrate is added to the silver jewel tone or the silver or gold metallic to reach the desired shade. Some very brilliant colour tinted metallics can be achieved using this method. The drawback to this system, as with all inks, is that the addition of colorants or other components to the ink will change its opacity or viscosity.

With metallics, any addition will result in a diminishing of the brilliancy of the metallic pigments. (I should add that in the lab at International Coatings with some of the more finely ground particulated inks, I have been able to add a considerable amount of colour concentrate whilst still retaining quite a degree of metallic sheen – see Figure 5).

The quality of resin used by the ink manufacturer can also have an effect on the shine: if an impure or resin that is lacking in transparency is used, this will inhibit the reflectivity of the particles.

PRINTING

The approach to screen printing metallic inks is typically the same as that of any plastisol or water-based system – the same variables are engaged and the same tools employed with regard to off contact, squeegee angle, mesh selection and print order. Some of the more

Figure 4

Figure 5: The author has been able to add a considerable amount of colour concentrate whilst still retaining a degree of metallic sheen

Figure 6: Solutions to the oxidisation of metallic pigments include a clear coat and advising the consumer to hand-wash the garment

common variables encountered with printing metallics are outlined below.

Even though pigment processing technology has greatly advanced, particles of different sizes will still sometimes make their way into an ink. This is particularly evident when using inks with larger flakes, such as glitter. This may cause some of the flakes to hang in the screen as they cannot penetrate the mesh. The issue is less evident in inks with smaller particles, although lower mesh counts are advisable to achieve maximum opacity.

As with all screen printing inks, the choice of substrate is critical – and with metallics it is even more so. If printing on an absorbent material, care should especially be taken. The resin used with metallics will tend to be absorbed into the material, leaving the pigment particles on top.

With smaller powdered particles this can be particularly problematic for two reasons. As mentioned earlier, in inks with coated flakes the pigment will rise to the surface of the ink film during the curing stage. They can sometimes then rub off or crock. This is especially true when the ink is hot. It can be avoided by adding a clear coat, but this will then diminish the brilliance.

Because the pigments are true metal, they will also tarnish or oxidise like true metal. This is particularly problematic with gold. Again, one solution would be a clear coat, another is to advise the consumer to hand wash the garment (see Figure 6).

SPECIAL EFFECTS

In spite of the seeming limitations imposed on printing with metallics outlined above, the inks do display a surprising amount of versatility. The ability to tint and add colour coupled with some of the inks' ability to retain metallic sheen, even when mixed with thickening agents and / or other speciality bases, gives them added allure.

Figures 7, 8 and 9: Examples of metallic special effects

Innovations in automatic machine configurations, such as in-line foil additions and the ability to use multiple flash heads, offer opportunities for the creative use of these inks. Effective use of stencil systems including capillary film can, for anyone willing to invest time in R&D, lead to results thought impossible a decade ago (for examples of metallic special effects, see Figures 7, 8 and 9).

Lastly, and as mentioned earlier, the advances in pigment processing that allow for the development of smaller pigment particles allow us to use a much higher resolution graphic than would normally be applicable for screen printing onto textiles. We can now design and execute with ease half tone metallic prints onto T-shirts. Metallic inks are now a standard item in every ink room and look very likely to stay there. SP

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Figure 8

Figure 9

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FOLLOWING SWEDISH TRADITION

Claudia Wildi-Conde reports on how one company has successfully engaged with the long tradition of large format screen printing in Sweden

SWEDEN IS ONE OF THE COUNTRIES IN EUROPE WHERE SCREEN PRINTING HAS ENJOYED PARTICULAR GROWTH; IT HAS DEVELOPED STRONGLY THERE NOT JUST BECAUSE SWEDEN IS HOME TO GLOBALLY SUCCESSFUL MACHINERY MANUFACTURERS, BUT BECAUSE LARGE FORMAT SCREEN PRINTING HAS A LONG TRADITION IN THE COUNTRY.

The probable cause of this successful development over a period of many years lies in the size of the country, and the associated need for printed advertising products plays a key role. Since its successful establishment as a competitive option, the specific performance parameters of screen printing have made it the ideal printing process for the demands of effective indoor and outdoor advertising and the print runs that are typical of Sweden. Unlike Germany, for example, where offset dominates the advertising scene, screen printing has consistently secured a very substantial share in all areas of advertising.

High performance screen printing companies, such as the Swedish multinational SCA Packaging, are evidence of this progressive development over many years. It is no surprise, therefore, that the demand for quality in screen printed products is unusually high in Scandinavia in general, and in Sweden in particular. Anybody who wants to retain a place in the front rank of printers here must operate at an extremely high and professional level.

At SCA Display's Norrköping plant to the south of Stockholm, over 70 skilled staff work in a modern screen printing operation producing large format elements for indoor and outdoor advertising, as well as design and manufacturing retail displays. All jobs are printed on materials that the group itself has produced. Drawing on its 70 years of experience, the quality demands that the SCA plant consistently meets and the printing services it offers compare well with the rest of Europe.

A LOOK BEHIND THE SCENES

SCA Packaging Sweden, the parent company of SCA Display, is a large multinational company in the paper industry and employs over 50,000 people worldwide in production, management and sales. Paper and board are produced in large mills for a wide range of applications.

A high level of quality is ensured by a skilled and experienced workforce, whose abilities are focused on specific targets in a co-ordinated production workflow. Obviously production facilities that are suitably equipped to allow the individual processes to be carried out reliably, successfully and to cost, form one aspect of this. For a quality-conscious company, this means constantly monitoring the market for the right means of production and a readiness to ensure that the machine park is kept at the very highest level through investment.

Over recent years, purchases of new equipment and machinery in all areas of screen printing at SCA mean that its facilities are now of the very highest standard. Three key factors have driven this development. Firstly, new possibilities for screen printing have opened up through breakthroughs and advances in electronic data processing. Secondly the demands made by customers on advertising material have had a major impact on the performance screen printing needs to deliver, and lastly, there is the trend for distinctive product development across broad areas of modern branded goods advertising.

CHANGE IN THE JOB STRUCTURE

This general overall trend has resulted in ever shorter run lengths for printers, whilst the variety of subjects and motifs is constantly increasing and delivery times keep on getting shorter. Such developments are both a challenge and an opportunity for competitive screen printing companies.

SCA recognised this development some years ago and took appropriate steps at an early stage. Besides its experienced workforce, the company has the very latest machines to enable it to satisfy all quality and printing format requirements up to 160 x 320 cm.

SCA's many years of co-operation with Lüscher means that it is today using the very latest computer-to-screen (CtS) DX technology for the production of its formes, and this is something that the company believes is a fundamental step towards satisfying the increasing demands of a customer base that is very choosy about quality. In terms of efficient production workflows, the Lüscher DX CtS system handles an important stage and has also helped to move costs in the right direction.

ADOPTING CTS TECHNOLOGY

Before adopting CtS technology, up to four people were required to carry out the same tasks. Today, the digital parameters of the job are laid down by specialists at the job preparation stage and operation of the CtS system is confined to changing the screen frames as required. The traditional monitoring functions and the additional time required for film assembly and operation of the vacuum frame and exposure lamps are now all things of the past.

Besides the technical capabilities of its CtS systems, the reliable technology of the Lüscher DX makes a positive and important contribution towards the meeting of deadlines. The output in square metres per hour of the CtS system is a known quantity and this allows time requirements to be calculated with confidence.

The timing of forme production needs to be

The JetScreen WAX

closely co-ordinated with the availability of the relevant printing systems. The ability to plan production stages precisely means that unnecessary idle times and their associated additional production costs are avoided. The benefits of a smooth production workflow are not simply a target that SCA is working towards, but with the aid of defined control steps they form a fundamental part of the company strategy.

WAX TECHNOLOGY

Lüscher has devoted considerable efforts to CtS technology. After initial teething troubles of the kind to be expected with any new technical development, the company has now installed more than 450 of its JetScreen CtS systems at customer sites all over the world.

With wax technology, tiny opaque drops of liquid wax are jetted from nozzles onto the photographic emulsion of the stencil; the opaque coating that they form creates the image in place of conventional film. The emulsion is then exposed, processed and dried, and the stencil is then ready for printing.

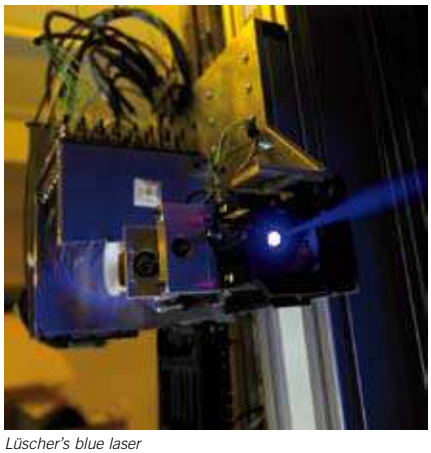
This idea is based on the fact that heated wax is a liquid, but when it cools it solidifies. The wax drops set in direct contact with the photographic emulsion, ensuring an excellent imaging quality. Faults due to the cut edges of film, adhesive strips or dirt are eliminated by CtS systems. The water-soluble wax simplifies the processing of the stencil, allows the water to be recirculated and results in a cleaner processing system.

In essence: image, expose, process, dry without film at a resolution of up to 700 x 700 dpi that satisfies the high quality requirements of halftone and line work.

INCREASING PRODUCTIVITY

Any photographic emulsion can be processed, and the exposure uses familiar light sources. The production of the film colour separations, including developing and retouching, additional copying, processing of the photographic emulsion, drying and further retouching, are all eliminated by CtS, with considerable staff savings.

As a modular system with a maximum format of 8000 x 3800 mm, it offers remote diagnosis via modem, simultaneous imaging of one or more stencils, UV exposure on the JetScreen, image processing tailored to screen printing, colour separation, high productivity and low maintenance requirements.



Lüscher's blue laser

The JetScreen DX flat

For the last five years SCA Packaging has been using a JetScreen for routine production at its Norrköping facility. As a natural consequence of this co-operation, SCA became one of the first customers to install Lüscher's newly-developed JetScreen DX flat with laser imaging, resulting in increased productivity with a maximum output of 25 m^2/h whilst eliminating consumable costs.

DIRECT LASER PRINTING

The JetScreen DX flat allows full depth curing of the emulsion layer, even on yellow fabrics, and a standardised tonal range through consistent laser output. It has variable resolutions from 300 to 2400 dpi. Screen printing formes produced using the new direct laser imaging system offer a leap forward in screen printing quality.

The use of long-lived high performance blue laser diodes and the elimination of all other consumables mean that ongoing production costs for textile and screen printing formes are substantially lower. Direct laser imaging also improves stencil quality in terms of the edge definition of the exposure. The printable image resolution and the mechanical and chemical resistance over the print run are increased.

Virtually all 'normally sensitised' emulsions and capillary film systems can be optimally exposed with no imperfections, and at top speed from the print to the squeegee side. Whether a white, a stainless steel or a body-coloured anti-undercutting mesh is used is irrelevant to the direct blue laser. In addition to excellent emulsion curing, it also ensures that the exposed forme will have a very high abrasion, water and solvent resistance. Depending upon the desired forme dimensions, Lüscher offers the JetScreen DX with 32, 64, 96 or 128 laser diodes.

Lüscher's Laser JetScreen DX is available in all current external printing frame formats, starting from 500 x 500 up to a maximum frame format of 8000 x 3800 mm.

CUSTOMER CARE

When dealing with technically demanding production systems, availability is an issue. Important aspects of customer service include a technical service with a round-the-clock hotline, a real understanding of troubleshooting, and ongoing personal customer contacts.

Stefan Thulin is responsible for international customer care at Lüscher; he looks after the details, no matter how seemingly trivial, that result in a satisfied customer. His regular customer visits and discussions provide an opportunity to discuss important questions, and this helps to maintain a lasting customer-supplier relationship.

Stefan is both a knowledgeable specialist and a long-standing employee and as such, customers accept and value him. He ensures a close link between the customer and management and engineers, and by providing such care, Lüscher aims to foster long-term relationships. SP

Claudia Wildi-Conde is from Leitung Marketing Services & PR

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California legislates on chemicals

The US state of California recently legislated to reduce or eliminate hazardous chemicals in products and the environment. AB 1879 establishes authority for the Department of Toxic Substances Control to develop regulations to create a process for identifying and prioritising chemicals of concern and to create methods for analysing alternatives to existing hazardous chemicals, giving the Department the authority to take action to potentially restrict or ban any chemicals following an assessment.

The new law means that instead of making chemical policy by legislating on a case-by-case basis, the state's Green Chemistry Programme will evaluate the health effects of chemicals and possible alternatives with a science-based "systematic and comprehensive" approach. A provision in the law, which would have required manufacturers to disclose to the state details of the chemical ingredients used to manufacture their products and information about their effects on health, was removed. Currently the US national Environmental Protection Agency is not allowed to share its information on the chemical constituents of products with individual states.

"[This legislation] puts an end to the less effective 'chemical-by-chemical' bans of the past," Arnold Schwarzenegger, Governor of California said. "With these two bills, we will stop looking at toxics as an inevitable by-product of industrial production. Instead they will be something that can be removed from every product in the design stage, protecting people's health and our environment." SP

Steinemann acquires SPS® ScreenPrintingSystems

Steinemann Technology of Switzerland has acquired German company SPS® ScreenPrintingSystems to add to its portfolio of systems and solutions for finishing print products with varnish; the company also recently acquired Fleischle Siebdruckmaschinen, subsequently establishing Steinemann Coating. The graphic arts product range of SPS® will be integrated in the Graphic Division of Steinemann Technology, with both the SPS® brand name and machine range being retained.

"By incorporating SPS® in our Graphic Division in what is certainly a fairly difficult market environment at the moment, we have taken a major step towards putting our company's positive development on an even broader footing," commented Jürg Spittler, Vice President of Steinemann Technology and Director of the Graphic Division. "We are now in a position to offer customers systems and solutions to meet all screen printing requirements from a single source, in terms of both printing formats and printing speed." SP

New UV-curable graphic adhesives

Kissel + Wolf has introduced Kiwoprint UV 33, a new UV-curable pressure-sensitive adhesive for permanent foil and reverse glass print displays, as well as colour transfers for dry and wet application. Typical applications are for permanent advertising displays, ink transfers for vehicle decoration and labels and stickers for indoor and outdoor use.

Fast curing results in shortened cycle times. As Kiwoprint UV 33 is solvent-free, there are no VOC problems or other relevant environmental issues. When printing large format foil displays, either blotch or half-tone, there is no danger of the adhesive drying up in the screen, even with the finest mesh. Other advantages are good water and ageing resistance and good compatibility with many printing inks. SP

Swiss group buys digital printing companies

The Swiss WIFAG Polytype Group has announced that it has acquired the business, products, technology, knowledge and staff of Spuhl's (Switzerland) digital printing activities and L&P Digital Technologies (USA). WIFAG Polytype's companies supply high-end newspaper rotary presses, container decorating equipment for the food, cosmetics and packaging industry, and trade in consumables and equipment for the graphics industry.

The new company will continue the sales and development of Spuhl digital printers

The two acquisitions will be integrated into a new division of the Group in Switzerland; the newly-formed WP Digital will continue the development, sales, distribution and service of the former Spuhl digital printers. This will include the Virtu UV large format printer, a combined roll and flatbed printer which can imprint flexible roll goods such as adhesive foil or textiles, and sheet materials such as Dibond, metal or wood. SP

Kammann restructures its US business

US companies Kammann Machines and Kammann Machines Service have merged to form Kammann USA in an aim to deliver more proactive and integrated product and service solutions for customers in North America. Kammann Machines is a solutions provider for printing onto glass and plastics, web printing operations, medical device and printed electronics production, and Kammann Machines Service provides parts and service support for Kammann machines in North America.

Paul Bolduc, the former President of Kammann Machines Service, will be President of the new Kammann USA with Steve Gilbertson as Vice President of Sales and Marketing. "Integrating the product and service expertise within one organisation ensures the best experience for our customers, from the first discussion of a Kammann solution, to the ongoing support and maintenance of that technology," explained Paul Bolduc. SP

Nazdar pre-registers for REACH compliance

Nazdar, manufacturer of screen and digital printing inks, has completed the pre-registration process in accordance with the European Union's Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) legislation. The company has begun the evaluation of substances registration in accordance with the schedule provided by REACH, which provides three deadlines (2010, 2013 and 2018) for registration. Nazdar currently estimates that applicable substances used by the company will not need to be registered until 2018.

"Nazdar is committed to meeting its legal obligations under REACH and has spent substantial time and effort to understand this complex regulation and determine the best way to ensure compliance with REACH," explained Erik Reed, Manager of Regulatory Compliance for Nazdar. "In addition to supplying the highest quality products and service to our customers, Nazdar is committed to protecting the environment and to our responsibility as a global corporate citizen." SP

Nazdar has pre-registered for the EU's REACH legislation

Membrane switch specialist joins ESMA

Nicomatic, supplier to more than 500 membrane switch manufacturers worldwide, has become the latest company to join ESMA, the association of European manufacturers of machinery and consumables for the specialist printing industry. Nicomatic designs and manufactures interconnect solutions and is a leading manufacturer in the metal dome switching technology for membrane switches and mobile phones. Products include UltraThin SMD LEDs which use the 1206 package but maintain a 0.5 mm height, and allow the membrane switch manufacturer to eliminate embossing and / or use less spacer material. Nicomatic also supplies a large range of adhesive spacers (30 µm to 400 µm) designed for use in the construction of membrane switches.

New drying technology delivered

The new dryer

THG, a global manufacturing and technology group based in Scotland, has invested in the latest drying technology from UK print equipment manufacturer Natgraph. The new Natgraph Air Force/IR/UV Combination Dryer is one of several recent investments made by THG to facilitate the long-term expansion plans of its manufacturing services division, Mekall.

Natgraph was chosen by Mekall to provide a conveyorised drying system to cure silver conductive, graphic overlay and dielectric inks at higher production speeds, with a lower rejection rate and better control than the existing systems within a smaller footprint. The Natgraph Air Force/IR/UV Combination Dryer ensures that once Mekall had completed optimisation tests for each ink system, the dryer will operate at the same settings with no deviation.

"The consistency of cure, excellent inter-coat adhesion and lack of contamination has already made a difference to our output and efficiency," stated John McKay, Print Manager of Mekall.

Ink supplier seeks UK partners

OEM ink specialist Bordeaux Digital Printink has announced a new partnership programme directed at UK distributors and wholesalers of digital ink, industrial printers and consumables for the wide format industry. The company, which develops, manufactures and distributes quality OEM inks for wide and super wide digital printers, is aiming to form partnerships and alliances with UK-based businesses. The new partners will be involved in the planned business expansion, geared to provide custom-orientated solutions to fulfil digital ink market needs in the UK.

"We will be conducting penetration activities in the UK market, which we regard as crucial to our overall success," Dror Muallem, VP for sales & marketing, explained.

Thieme restructures sales division


Christian Schweickert, Oliver Beck and Juergen Weischedel

Following the establishment of its subsidiary, JRT Photovoltaics, screen printing machine manufacturer Thieme is restructuring its industrial and graphics sales division. In future, new sales management positions will be filled by long-term Thieme employees to provide continuity.

In its printing systems sector Peter Geiger will become Technical Director, taking over from Markus Bau who is now the new Managing Director of JRT Photovoltaics, and who will relinquish his sales responsibility to Thieme's Managing Director, Frank Thieme.

The sales responsibility for the industrial and graphic screen printing business sectors will be taken over by Christian Schweickert (Industrial) and Oliver Beck (Graphics). Christian will succeed Klaus Messmer, who is now Sales Manager of JRT Photovoltaics, and Oliver is taking over from Juergen Weischedel, who will assume responsibility for the Training Sector.

Maurizio moves


Maurizio Fantato

Maurizio Fantato has left MacDermid Autotype to join AEA technology as Marketing Manager for the National Chemical Emergencies Centre. When working on ESMA's EPP Committee in 2006, Maurizio volunteered to work with Chris Whitmarsh of Sun Chemical as the steering team to offer advice and oversee the development of this magazine. Maurizio and Chris's industry knowledge and expertise have been invaluable in establishing *Specialist Printing* as the leading international journal for technical matters relating to digital, screen and pad printing. Maurizio's contribution will be greatly missed and the publishers of *Specialist Printing* sincerely wish him well for the future.

Two new inkjet products launched

Sihl has launched two new products: a light box display film and a high-end inkjet product. The SuperDry Light Box Film 175 satin 3461 incorporates the company's microporous SuperDry coating technology which allows inks to adhere more effectively, giving high quality results on major inkjet systems. The high level of colour saturation achieved allows a wider colour gamut, and the natural reproduction of achromatic colours combined with very deep blacks gives a three-dimensional picture and luminous quality.

The SuperDry layer absorbs large quantities of ink in a controlled way within fractions of a second. The colouring agents (pigments or dye-based inks) are fixed to the surface and water and other ink components are drained off through microscopically fine channels. The stiffness of the polyester film gives optimum flatness and tear-resistance, making it ideal for high-end photo and graphic reproduction.

The SuperDry Display Film 165 is a glossy and easy-to-use opaque white polyester film with excellent rigidity to give good flatness under varying climatic conditions. These films have a special antistatic backing and are ideal for photo reproduction in various sectors of the industry, including exhibition poster creation, display films for the POS sector, high quality photo reproductions, pop-up displays and packaging proofs.

Printer-router partnership package offered

Triangle Digital INX (TDI) has announced a partnership with MGE to offer owners of the Milano UV curable hybrid printer a solution package that includes MGE's i-cut GraphicsRouter. The two-unit package will provide an optimised workflow solution and a more affordable leasing package.

The i-cut GraphicsRouter is a vision-based finishing system for short run graphics, with integrated workflow from design through the RIP to accurate digital finishing. It provides automated routing / finishing for short run laminated graphics or for graphics that are printed on rigid substrates.

These capabilities are now available for smaller digital print shops and other users of Milano printers. When paired with the Milano 205 (80-inch) and 250 (98-inch) hybrid printers producing 4x8 feet or larger rigid printed media, the i-cut GraphicsRouter becomes an efficient near-line finisher able to keep up with or be faster than the printers.

CTS & DIGITAL WORKFLOW 2008 OFFERS ADVANCED TECHNOLOGIES

CTS & DIGITAL WORKFLOW 2008

THE CTS AND DIGITAL WORKFLOW 2008 CONFERENCE AND EXHIBITION WAS SUCCESSFULLY STAGED IN NOVEMBER IN GERMANY, OFFERING PRINTERS THE LATEST ADVANCED TECHNOLOGIES FOR COMPUTER-TO-SCREEN APPLICATIONS AND ACHIEVING A BETTER DIGITAL WORKFLOW.

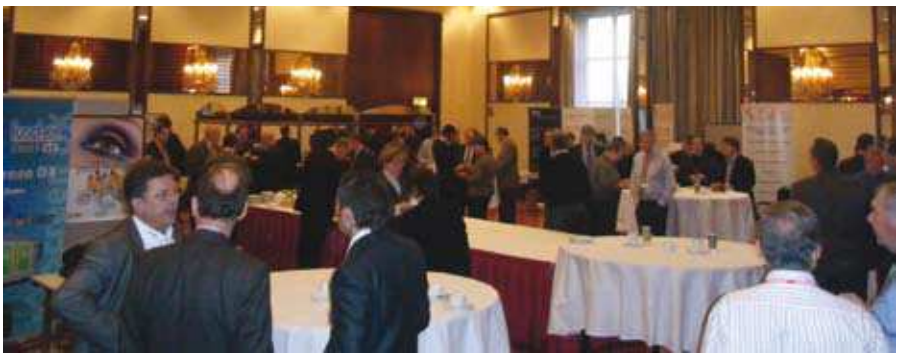
CTS and Digital Workflow 2008 expanded upon the successful inaugural CTS 2007 event to also cover digital workflow specifically for screen printing and CTS. Suggestions from attendees of the 2007 event were acted upon, and the 2008 conference programme included more coverage on all aspects of supporting and using CTS.

CONFERENCE

The simultaneous English-German language conference provided attendees from 13 different countries with an insight into the systems available, the screen and stencil considerations and the in-house requirements. Expert speakers made the following presentations to the 99 printers, managers, owners, designers, print buyers, manufacturers and suppliers in attendance:

- Keynote presentation – can screen and digital co-exist? (Graphicworld)
- Keynote presentation – CTS in an industrial application (M Berwinkel, Sonopress)
- Benefits of pre-press work flows for screen printing (Colorgate)
- Evaluation of CTS systems (CST)
- Blue laser technology in CTS – how it can save time and money (Lüscher)
- Perfect stencil materials for CTS systems (KiWo)
- Choosing the right fabric, frame and squeegee (Hurtz)

Expert speakers made presentations to 99 conference attendees



The accompanying tabletop exhibitions of leading manufacturers of machinery and consumables were a great success

- Resolution and addressability – advantages and pitfalls of digital to screen systems (Mantel)
- Total solutions using most advanced screen stencil technology (Murakami)
- Why screenprinters should invest in CTS systems (SignTronic)
- Optimised digital workflow (K-Flow)
- Emulsion stencil problem solving (MacDermid Autotype)
- How to match a standard proof in screen printing! (L Mullaney)
- RFID controlled work flow management for screen print processing (RFID project group)
- Process reliability – from digital file to printed product (Sefar)
- CTS: The best stencil solution (Saati).

If you were not present at the event and would benefit from viewing the full presentations, they are available for download for only €95. For more details, please contact Samantha Dunmore (samdunmore@specialistprinting.com).

EXHIBITION

The conference programme was supported by regular intervals dedicated to the accompanying tabletop exhibition of leading manufacturers of machinery and consumables, including: ColorGATE Digital Output Solutions, Color Scanner Tehcnology, Grünig-Interscreen, Hurtz, Heinrich Mantel, K-Flow, Kissel + Wolf (KiWo), Laurie Mullaney Associates, Lüscher, MacDermid Autotype, OYO, RKS, Saati, Sefar, SignTronic, Specialist Printing and Sun Chemical.

Contact details and areas of activity for these exhibitors can be found at www.esma.com

FEEDBACK

Feedback from delegates and exhibitors after the event indicated that:

- **100% thought the standard of the conference programme was good**
- **100% said the conference presentations would be useful to their business**
- **96% thought the meetings in the tabletop area will be useful to their business**
- **100% said the organisation during and before the event was good.**

A selection of comments from delegates and exhibitors included:

"CTS Forum 2008 was a multi CTS technologies conference with a constant factor from all speakers. CTS is a must for all of us in screen printing on the way to a standard process following the offset CTP way." **David Zamith, Managing Director of Ruy de Lacerda**

"I feel the big improvement this time was the choice of venue which was much better in its layout and the introduction of multiple language support for the presentations." **Steve Clarke, Sun Chemical**

"This event was a great platform for information exchange on cutting edge technology for manufacturers, distributors and customers." **Karsten Moses, Sefar**

"For me, it was a very good seminar and event. Hearty thanks to you all, from the organising team (Chameleon) to ESMA (Peter Buttiens)." **Thomas Schweizer, SignTronic.**

ORGANISERS:

CTS & Digital Work Flow 2008 was jointly organised by ESMA, an association of European manufacturers of machinery and consumables for the specialist printing industry, and Chameleon Business Media, publishers of *Specialist Printing* and its sister journal, *Glass Worldwide*.

ESMA specialist printing in focus
www.esma.com

Chameleon Business Media Ltd
www.cbm-ltd.com

EUROPEAN MEMBRANE SWITCH SYMPOSIUM 2008 IS FIRST-TIME SUCCESS

STAGED IMMEDIATELY AFTER THE CTS EVENT, THE INAUGURAL EUROPEAN MEMBRANE SWITCH SYMPOSIUM WAS DEEMED AN OUTSTANDING SUCCESS BY THE INTERNATIONAL AUDIENCE THAT GATHERED IN DÜSSELDORF, GERMANY TO BE PRESENTED WITH THE LATEST ADVANCED TECHNOLOGIES FOR MEMBRANE SWITCH AND INDUSTRIAL GRAPHICS MANUFACTURE. IN TOTAL MORE THAN 130 ATTENDEES WERE PRESENT, INCLUDING PRINTERS, MANAGERS, OWNERS, DESIGNERS, OEMS AND SUPPLIERS FROM 14 DIFFERENT COUNTRIES.

In recent years processes, supplier capabilities and competitive pricing have established membrane switches as the preferred technology across a wide range of applications, covering many different products and industries.

EXPERT PRESENTATIONS

Expert speakers recognised the functional, aesthetic and integration advantages of membrane switches by offering a series of educational presentations covering market trends, current technologies and future opportunities. The following programme in simultaneous English-German also provided delegates with advice on best practice in operating and production for lean manufacturing:

- Keynote presentation – market scenarios and trends for the membrane switch business (H Hartmann, Kundisch)
- Substrates and influencing choices (MacDermid Autotype)
- Computer to screen application in membrane switches (Kissel + Wolf / KiWo)
- Drying / curing of screen printed surface coatings for electronics applications (Natgraph)
- UV screen printing and the combination with digital printing for membrane switches (Marabu)
- Conductive ink technology (Sun Chemical)
- Application of screen printable adhesives for membrane switches (Kissel + Wolf / KiWo)
- New developments in digital printing for membrane switches (Folex)
- Cylinder printing and new drying technologies for membrane switch (SPS® REHMUS)
- Spacer adhesives, metal domes and interconnect solutions for membrane switches (Nicomatic)
- Web screenprinting for membrane switch (Preco)
- UV curing on polycarbonate film (Nazdar)
- Image analysis and membrane switches (MacDermid Autotype).

The full presentations are also available for download for only €95 by contacting Samantha Dunmore (samdunmore@specialistprinting.com).

The conferences were presented simultaneously in both English and German

EXHIBITION

Due to overwhelming interest in the event, an evening drinks reception was added to the programme, and delegates also benefited from visiting the accompanying tabletop exhibition of leading manufacturers of machinery and consumables, including: 3M, Encres Dubuit, Fimor, Folex, Hurtz, Hy.tech Forming Systems, Kissel + Wolf (KiWo), Lüscher, MacDermid Autotype, Marabu, Mimaki, Natgraph, Nazdar, Nicomatic, Norcote, Preco, Printcolor, Printworld, Proell, Sakurai, Sefar, Spartanics, Specialist Printing, SPS® REHMUS and Sun Chemical.

Contact details and areas of activity for these exhibitors can be found at www.esma.com

FEEDBACK

Feedback from delegates and exhibitors after the event indicated that:

- **97% thought the standard of the conference programme was good**
- **97% said the conference presentations would be useful to their business**
- **96% thought the meetings in the tabletop area will be useful to their business**
- **100% said the organisation during and before the event was good.**

Attendees were keen to see a follow-up event in the future, and a selection of comments from delegates and exhibitors included:

"Very good to gain knowledge about the whole membrane switch business, networking and business development." **Alexander Jauker, Trotec**

"The conference covered an interesting topic of technical screen printing which has not been covered satisfactorily in the past. We had very interesting contacts with international customers visiting the show and conference. We look forward to the next symposium." **Dr Thomas Dietrich, Folex**

"The symposium took place in front of a highly interested audience. So many visitors listened to the compact but nevertheless highly interesting lessons / presentations." **Günter Gutmann, Printcolor**

"A day of interesting information and space for discussions with suppliers and competitors." **Ralf Rehmet, Design&Siebdruck Freudenberg**

"Good contacts were made during discussions at the table-top exhibitions. Presentations were informative and demonstrated the diversity within this industry." **Martin Payne, Johnson Matthey Silver & Coating Technologies.**

Peter Buttiens (ESMA) with keynote speaker Hans Hartmann of Kundisch

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BIGGER VENUE A SUCCESS FOR SCREEN PRINT INDIA 2008

More than 8000 visitors attended the event

SCREEN PRINT INDIA HAS BEEN SUCCESSFULLY STAGED EIGHT TIMES OVER A 15 YEAR PERIOD; THE LATEST EVENT WAS HELD AT A LARGER VENUE, IN A BIGGER FORMAT WITH A GREATER NUMBER OF PARTICIPANTS.

There were over 120 exhibitors from India and abroad at Screen Print India 2008, showcasing screen printing equipment with live demonstrations. The three-day event attracted 8000 plus visitors from across India and several dignitaries from abroad, and covered a 4000 square metre area.

ATTENDING DIGNITARIES

Screen Print India 2008 was held from 5-7 September 5 at the Bombay Exhibition Centre in Mumbai; it was opened by James Gill, Vice-Chair on the Executive board of the Specialty Graphics Imaging Association (SGIA) and James Wong, Secretary of the China Screenprinting Industry Association (CSPIA), who performed the ribbon-cutting ceremony and lit the ceremonial lamp.

Other dignitaries present at the opening ceremony included Anil Brahmbhatt (President, Screenprinting & Graphics Association of India SGAI), P Dhandhapani and K Tirumuti, Executive Committee members of Tirupur Export Knit Printers Association (TEKPA) and Rashmikant Pandya (President, Gujarat Silk Screen Materials Dealers Association GSSMDA).

NEW VENUE AND AWARDS

The new venue for 2008 was selected in order to accommodate the greater capacity requirements, and was spacious and much easier to access. The increased space gave visitors the opportunity to witness some large-scale machinery, which would not have been possible at other venues due to space constraints. The SGAI / Screen Print India Achievement Awards and Screen Print India Awards for Excellence in Screen Printing 2008 were distributed at a gala function on the evening of 6 September, with members of the screen printing community congratulating their colleagues. SP

James Gill of SGIA and James Wong of CSPIA light the ceremonial lamp

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ISA INTERNATIONAL SIGN EXPO 2009
16–18 April 2009; Las Vegas, USA

BILLED BY THE ORGANISERS AS THE LARGEST SIGN SHOW IN THE WORLD, THE ISA INTERNATIONAL SIGN EXPO IS WHERE SIGN SUPPLIERS AND DISTRIBUTORS EXHIBIT SIGN INDUSTRY PRODUCTS, SERVICES AND TECHNOLOGIES TO A VAST AUDIENCE OF SIGN MANUFACTURERS. ISA INTERNATIONAL SIGN EXPO 2009 IS RETURNING TO MANDALAY BAY CONVENTION CENTER IN LAS VEGAS, NEVADA (USA), WITH EDUCATIONAL AND NETWORKING EVENTS TAKING PLACE FROM 15-18 APRIL AND THE EXHIBIT HALL OPEN FROM 16-18 APRIL.

A GROWTH EVENT

The ISA International Sign Expo has grown from a few hundred booths at the first show in 1947 to nearly 2000 at the last, representing 550 companies and serving an audience of approximately 20,000 attendees. This year's event has already sold more than 1700 booths to more than 430 companies.

Around 20 per cent of exhibitors and 14 per cent of attendees travel from outside the USA to the show, and that percentage continues to grow each year; ISA International Sign Expo 2008 included 3723 attendees representing 111 countries from outside the USA.

LEARNING OPPORTUNITIES

The show includes learning opportunities, with educational programmes focusing on topics such as graphic design, sign code legislation, business management, sales and marketing, technology and more. The ISA Discovery Seminar Series features interactive forums, hands-on workshops and seminars, and Continuing Education Units (CEUs) are available

Online registration is currently available: rates for admission to the exhibit hall are US $15 for ISA members and $30 for non-members before 2 April, and US $25 for members and $40 for non-members during the event. Additional fees apply for seminars and keynote speaker presentations. SP

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web: www.signexpo.org

STRONG TURNOUT AT FESPA WORLD EXPO ASIA-PACIFIC 2008

THE FIRST EVER FESPA ASIA-PACIFIC EXHIBITION, WHICH TOOK PLACE 28-30 NOVEMBER 2008 AT BITEC IN BANGKOK, THAILAND, ATTRACTED A STRONG NUMBER OF VISITORS DESPITE THE POLITICAL DEMONSTRATIONS THAT CLOSED BANGKOK'S SUVARNABHUMI INTERNATIONAL AIRPORT ONLY DAYS BEFORE THE EXHIBITION.

The event attracted 5247 visitors from 35 countries, with 94% of visitors coming from the host nation. Unfortunately, over 2000 international visitors who had pre-registered to attend the event were unable to travel to Bangkok, with an inevitable impact on the international visitor profile. The non-Thai visitors that attended the event were already in Thailand before the airport demonstrations commenced.

Event organisers were pleased with the outcome of the show, given the circumstances, and reported that visitors and exhibitors were very understanding and supportive. They also reaffirmed the choice of Thailand as a destination for FESPA Asia-Pacific and expect the event to return to the country in the future. SP

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GLASSPRINT 2009

THIS YEAR SEES THE WELCOME RETURN OF THE GLASSPRINT CONFERENCE AND EXHIBITION – THE LEADING EVENT IN EUROPE FOR THE DECORATION OF GLASS.

Being held in Germany from 25-26 November, GlassPrint 2009 is a two-day conference that will present anyone involved with the decoration of glass with the latest trends and new developments for the decoration of both flat and container glass.

GlassPrint 2009 will expand upon the highly successful 2007 event and will move to the spacious and easily accessible Maritim Konferenz hotel in Darmstadt (Frankfurt).

ADVANCED TECHNOLOGIES

Industry experts will present delegates with the latest advanced technologies for printing onto all types of glass, including:

- keynote address
- new directions in heavy metal-free inks
- innovation in digital printing
- advanced machinery technology
- efficient pre-press technology
- group discussions.

The event will once again be accompanied by an exhibition of specialist suppliers of equipment, consumables, technology and services, displaying the latest developments in inks, pre-press technology, printing equipment and supplies.

GlassPrint 2009 follows on from the previous event which was deemed an outstanding success by the international audience of 170 decorators and leading suppliers. Delegates travelled from over 20 countries including long distance destinations such as Belarus, Colombia, Israel, Korea, Peru, Philippines, South Africa and the USA.

GLASSPRINT IS ORGANISED BY:

ESMA www.esma.com – an association of European manufacturers of machinery and consumables for the specialist printing industry, including screen, digital and pad processes

Chameleon Business Media Ltd www.cbm-ltd.com – publisher of *Glass Worldwide* and *Specialist Printing*, an ESMA-sponsored, technology-driven publication covering wide format digital and screen printing throughout the graphic, industrial and textile sectors

FEEDBACK FROM GLASSPRINT 2007

Visitor feedback showed that:

- **96% of delegates and 100% of exhibitors thought the standard of the conference programme was good.**
- **96% of delegates said the content of the presentations would be useful to their business.**
- **100% of delegates and 100% of exhibitors said meetings in the table-top exhibition area will be useful to their business.**
- **100% of exhibitors said that the quantity and quality of visitors to their stand was good.**

Delegate comments included:

"Subjects covered were of much interest for me and we're going to update our processes in Schott Colombia." **Schott Envases Farmacéuticos (Columbia)**

"A well planned and organised conference; I was able to meet various key people and suppliers in areas that can assist my company in moving forward in the future." **Phil Hall, Technical & Quality Officer, Ardagh Glass (UK)**

LIMITED OFFER – REGISTER NOW FOR REDUCED RATE

If you are a glass decorator or a manufacturer of any type of glass, attending GlassPrint 2009 will help you add considerably more value to your end product. For a limited time, you can take advantage of a reduced 'early bird' delegate fee of only €395, including access to all presentations, exhibition displays, refreshments, lunch and dinner. Register online now at www.glassprint.org or email sales@glassworldwide.co.uk

Exhibition space at GlassPrint 2007 sold out very quickly, so if you haven't already reserved your table-top area at GlassPrint 2009, please call +44 1342 315032 to discuss availability.

"I believe that this event occupies an important place in the world in order to follow innovations and developments." **Ata Hakan Yavaslar, Business Development Engineer, Anadolu Cam Sanayii (Turkey)**

"All the suppliers and customers of the glass printing area were at GlassPrint 2007, which allows us to have a global overview of the latest developments." **Virginie Chevaldonnet, Chef de secteur R&D 'Nouveaux décors', Saverglass (France)**

"An important bi-annual event that every packaging professional interested in glass cannot afford to miss." **John F Schrurs, Director, Cape Decision (Belgium)**

To purchase the full presentations from GlassPrint 2007, please contact sales@glassworldwide.co.uk

Further information:
tel: +44 1342 315032
email: sales@glassworldwide.co.uk
web: www.glassprint.org

FUTURE EVENTS

FEBRUARY 2009
3-4 Media-Tech Conference 2009 (Los Angeles, CA, USA)
15-17 Sign & Graphic Imaging Middle East (Dubai, UAE)
28 February – 2 March FESPA Digital Printing India (Mumbai, India)

MARCH 2009
16-18 National Environmental Safety & Health Conference (Indianapolis, IN, USA)

APRIL 2009
16-18 ISA International Sign Expo 2009 (Las Vegas, NV, USA)
21-23 Media-Tech Expo 2009 (Frankfurt, Germany)

MAY 2009
5-7 SGIA Membrane Switch Symposium (Overland Park, KS, USA)
12-14 FESPA Digital Printing Europe 2009 (Amsterdam, The Netherlands)
12-16 China Print 2009 (Beijing, China)

AUGUST 2009
27-29 FESPA Mexico 2009 (Mexico City, Mexico)

SEPTEMBER 2009
23-26 Label Expo Europe 2009 (Brussels, Belgium)

OCTOBER 2009
6-9 Print Expo Hungexpo (Budapest, Hungary)
7-9 SGIA '09 (New Orleans, LA, USA)
8-11 Gamatex 09 (Istanbul, Turkey)

NOVEMBER 2009
25-26 GlassPrint 2009 (Darmstadt / Frankfurt, Germany)

For more event listings, visit the Events page on www.esma.com

INDEX TO ADVERTISERS

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There were 487 exhibitors at SGIA '08

SPECIALITY PRINTING PROFESSIONALS FLOCK TO SGIA '08

PRINTERS, SUPPLIERS, DISTRIBUTORS AND MANUFACTURERS FROM AROUND THE GLOBE MET IN ATLANTA IN OCTOBER TO ATTEND SGIA '08, THE MAJOR US SPECIALITY IMAGING EVENT. THE EXPO WAS HELD IN HALL C OF THE GEORGIA WORLD CONGRESS CENTER IN ATLANTA, GEORGIA, AND ATTRACTED MORE THAN 19,000 ATTENDEES WITH OVER 50 EDUCATIONAL SESSIONS AND TOOK UP 225,686 SQUARE FEET OF EXHIBITION FLOOR.

Throughout the tradeshow floor, industry experts demonstrated the newest technology advances in high-production digital and screen print devices, as well as direct-to-garment, special effects and post-print finishing tools and equipment.

VISITORS AND EXHIBITORS

In total there were 19,201 registrants; just under 86 per cent of registrants were from the USA, with attendees from Georgia, Florida, California, Illinois and North Carolina making up almost half of this percentage. Outside of the USA there were visitor registrations from 93 countries, with the highest proportions coming from Canada (3.23 per cent), Mexico (1.23 per cent) and South Korea (0.8 per cent).

There were 487 exhibitors at SGIA '08, and the total size of expo floor was 225,686 square feet. Chameleon Business Media, publisher of this magazine and a proud member of the SGIA, exhibited at the show and distributed free copies of *Specialist Printing* as well as the sister journal, *Glass Worldwide*, and the *Annual ESMA Glass Publication 2008* – a unique 28 page guide to decorating all types of glass.

EDUCATIONAL PROGRAMME

Registrants were able to choose from 51 educational sessions to help perfect their processes, ranging from Future Forums on hot topics (high production, inkjet printing and corporate sustainability) to hands-on screen printing workshops.

The educational programme at SGIA '08 offered critical industry knowledge, speaking to a wide variety of speciality imaging applications for novices and experts alike, with a programme of direct presentations by industry experts, thought-provoking panel discussions and hands-on workshops for garment decorators.

AWARDS

Among the many awards given during SGIA '08, the 2008 Innovator Award and the 2008 Howard Parmele Award are amongst the most prestigious for the speciality imaging industry. This year the Innovator Award was presented at the Keynote Luncheon to James Gandy of Gandinnovations for actively moving the digital imaging industry forward.

The Expo attracted more than 19,000 attendees

Exhibitors

Supporters of this magazine and members of its sponsors, NASMA and ESMA, who exhibited at SGIA '08 included:

3M Graphics Market Center
3M Industrial Adhesives & Tapes Div
AWT World Trade Inc
American Ultraviolet Company
Avery Dennison Graphics & Reflective Products Div
Brother International Corp
Chemical Consultants Inc
Chromaline
Clearstar LP
Dubuit
Durst Image Technology US LLC (Durst US)
EFI VUTEk
EPSON America
ErgoSoft
Fimor North America
Fujifilm Sericol USA Inc
Gandinnovations
Gerber Scientific Products
Grünig Interscreen
Hewlett Packard Company
IKONICS Imaging
Industrial Fabrics Corp
Intercontinental Chemical Corp
International Coatings
KIIAN Spa
KiWo (Kissel + Wolf)
M&R Printing Equipment
MacDermid Autotype Inc
MACtac / Morgan Adhesives Company
Marabu
Mimaki USA Inc
Mutoh America Inc
Nazdar Consulting Services
Nazdar Inks & Coatings
Nor-Cote International Inc
Oce Display Graphics Systems Inc
Pleiger Plastics Company
PolyOne Corp
R Tape Corporation
Roland DGA
Rutland Plastic Technologies
SaatiPrint USA
Sakurai USA
Sefar Printing Solutions Inc
Siasprint Service
Sign-Tronic AG
Spartanics3
Sprayway Inc
Sun Chemical
ST Media Group
Summit UV
Thieme Corporation
Triangle Digital INX
Ulano Corporation
Union Ink
Zünd America Inc

A full list of companies that exhibited can be found on the website.

The educational programme included a number of direct presentations by industry experts

Co-owners and brothers, Ben and David Landesman of Lawson Screen & Digital Products were presented with the Parmele award at the Friday Night Dinner Party, and SGIA also awarded the Golden Image / Andre Schellenberg winners while at the show, and named the Product of the Year devices.

THIS YEAR'S EVENT

This year's SGIA Expo will be held at the Ernest M Morial Convention Center in New Orleans (LA) from 7-9 October 2009; pre-registration and advance hotel reservations are currently available via the website. SP

Further information:
web: www.sgia.org