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2016

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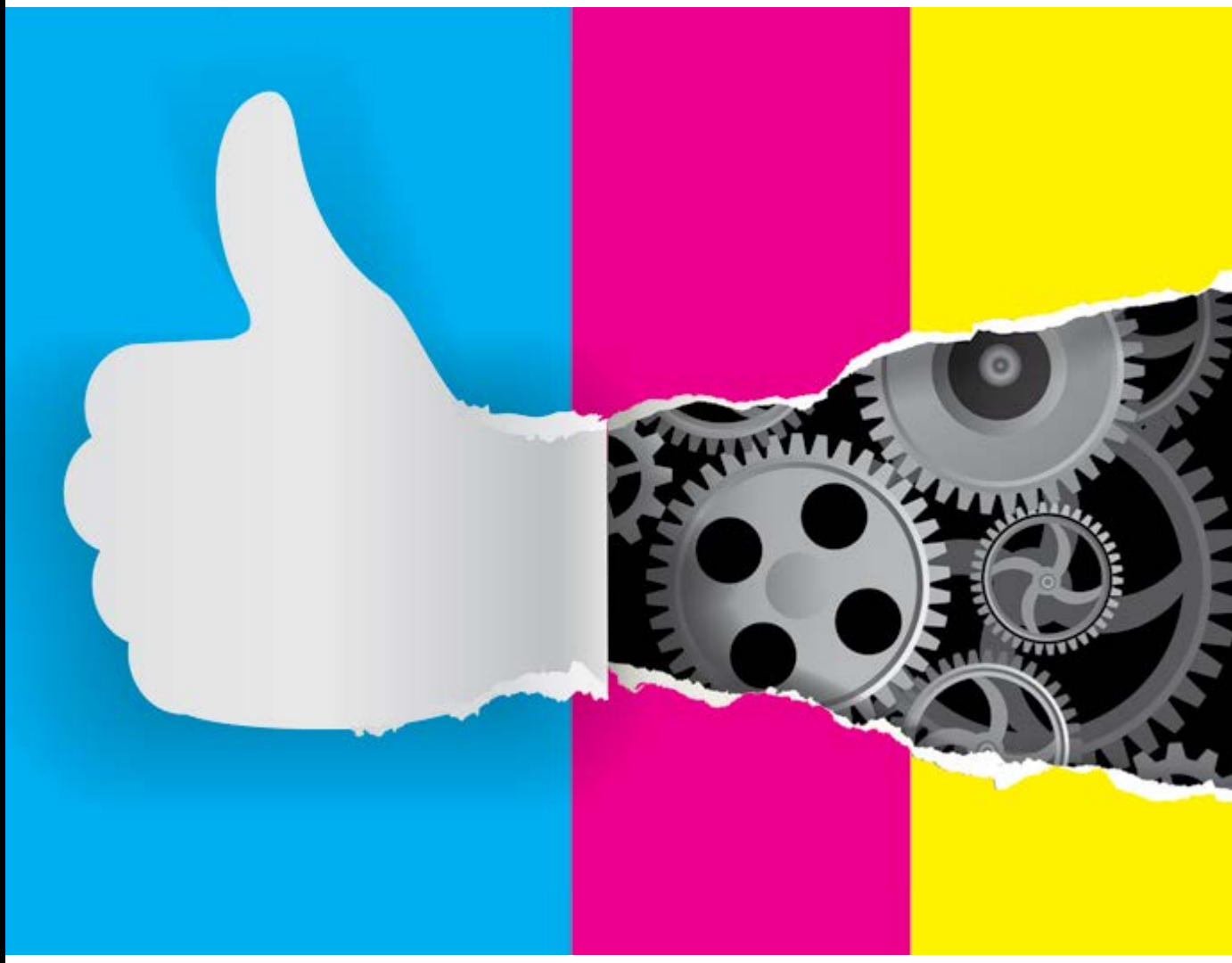

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WELCOME

Fast approaching our tenth year of publication, a key reason for the ever-growing interest in *Specialist Printing Worldwide* is the carefully prepared blend of screen and digital content that appeals throughout the industrial, graphic and textile sectors.

Ongoing discussions about how to define the term 'industrial print' is testament to how strong the interest is in the wide range of applications that come under the industrial umbrella. Complementing the topical material we circulate globally in every issue, trade associations such as ESMA, FESPA and SGIA have already integrated industrial streams into their successful 2016 events to address the need for dedicated information.

Those interested in industrial print technology will now gather in Milan in November for the third edition of InPrint, a show dedicated to industrial applications of printing, and we are pleased to preview the event on pages 66-70. We wish InPrint 2016 the best of success and look forward to supporting further events that address the industrial field in 2017.

Glass decoration is certainly deemed to be an important area of industrial printing and those active or looking to get involved in this fast-growing sector can already register their interest in Europe's only dedicated conference and exhibition, GlassPrint 2017, at www.glassprint.org.

As always, quality editorial in the following pages also addresses the latest technology in the graphic and textile sectors and we remain committed to spreading the latest technical know-how to a global audience. The only way to benefit from future educational content is to subscribe now to the next four issues (a years' supply) at www.specialistprinting.com for a total of only €58, $84 or £48.

Manufacturers of machinery, equipment, software or consumables can also visit our website to request 2017 media information and receive a customised proposal aimed at reaching existing and potential customers through our regional and global platform.

Bryan Collings, Publishing Director, Specialist Printing Worldwide

THE POWER OF THE PROCESSOR

Sophie Matthews-Paul comments on how the world now takes computerised technology for granted

Recently I have been turning my attention back to the wide-format segment, which is where I originally made my entrance during the very early days of digital adoption back in the 1980s. In those times one of the key problems with driving any technology forward was the lack of processor power and even the most humble home computer was priced beyond the budgets of the majority. Ever the geek, I wanted to learn more. So I took to building my own PCs to satisfy my own curiosity (but also because I am no good at knitting). Ergo, fiddling with small components and screwdrivers helped while away my evenings when there was little worth watching on the television.

At the time that I was tinkering with bits like X386 processors, 20MB hard drives, Hercules graphics cards, and serial and parallel ports I never imagined for one moment where these early computers would take us and how our lives would become dominated by technology, in both commercial and domestic environments. As a potential driver for printing equipment all those years ago processor power was starting to find its feet in the pre-press world but it was still a costly element; businesses needed to justify the transition, say, to a drum scanner or a more automated method of producing films, screens and plates. Technology was still pretty limited and dependable reliability was rare.

TAKING PROCESSES FOR GRANTED

Although trade shows had touched on more innovative processes it wasn't until Ipex in 1988 that I truly noticed the coming of a serious shift that would impact all segments of the printing industry. Yet, today, we are all really very spoilt because, whether we are a user, a developer, an integrator or a manufacturer, all the dirty work has been done for us when it comes to the basic processors that we rely upon to make our machines work. We know that operating systems and programs should be able to handle the most complex of tasks without keeling over and we expect our computers to toil endlessly, day in and day out. We also take for granted that the combination of hardware, firmware and software will not let us down in our hour of need. (And, of course, we maintain regular back-ups to make sure there are no losses should a failure of some kind occur.)

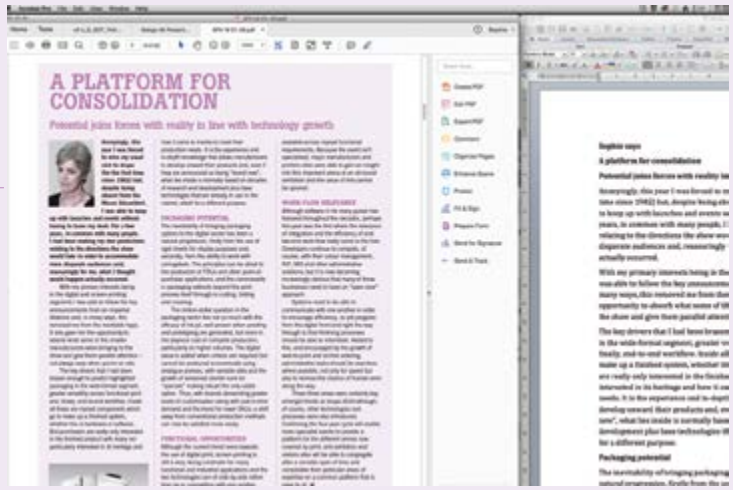
Regardless of the printing equipment we are using for our chosen production process somewhere beneath it all lies a reliance on a computer platform – even with analogue set-ups few are 100% manual in today's commercial and industrial world. As well as providing functionality and automation to drive our machines, most of us utilise software packages for origination, photographic manipulation and editing, layouts, text input and, of course, output file creation. Many businesses also rely on technology for colour accuracy, profiling and linearisation, as well as for turning our artwork into a format that is suitable for printed output.

EVER MORE COMPLEXITY

As we expect greater complexity in the devices we use and in the types of end result we demand, so the processing capabilities involved need to be able to handle more complicated data without compromising speed or accuracy. Developers of common computer platforms in my mind have excelled themselves in being able to address all their different markets and, as a result, there are few if any areas in today's industrial world where these machines don't play a role.

However, in all the arenas which have computers at their core, print in its many guises was always going to be a strong contender for processors and their capabilities. The reasons behind this are innumerable, fulfilling the need for consistency in repeatability and assisting and automating many of the former labour-intensive pre-press and on-press tasks many of which relied largely on training and skill. Add to these benefits of creative elements plus administrative and accounting functions, and it is easy to see how the once humble personal computer has evolved to become the backbone to most business functions. Would we manage without them? The answer is, surely, no.

This takes me back to where I came in – at the early days of computer power for the masses and when it became a viable proposition for everyone. You don't need to go back many decades to find a time when the words 'digital' and 'printing' didn't appear in the same sentence. Now, as technologies continue to help drive forward new and innovative devices and methodologies, it seems incredible that a component smaller than an After Eight mint can provide the processing power upon which so many industries depend. ■



Proofing Specialist Printing Worldwide *is just one example of where we take computers for granted*

Sophie Matthews-Paul is an independent analyst and editorial consultant to Specialist Printing Worldwide

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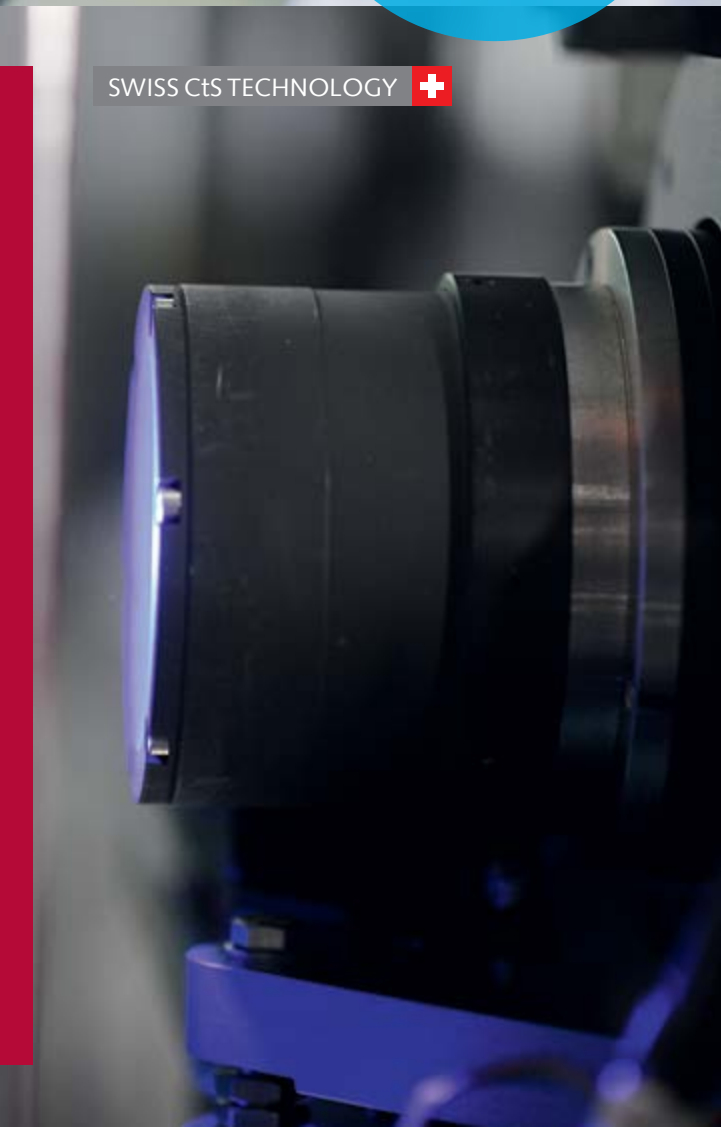

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SOLVING PROBLEMS IN THE REAL WORLD

Professor Steven Abbott continues his series with a look at complex screen faults

Over the years we've built up a large number of case studies of problems found in the real world for screen-printers. Here we share some of our experience of the issues and the solutions we have found and we're sure you may just recognise some of them. The faults are not listed in any particular order.

STENCIL THICKNESS VS INK THICKNESS

We all know that small increases in the stencil thickness (EOM) can have a big impact on the amount of ink that is printed. Therefore, it stands to reason that, 'you would need to use a thick stencil to get a thick print'. Unfortunately that is not always true. Yes, a high EOM will dramatically increase the ink deposit for small or narrow images/ tracks. However, if for example you want to reduce the electrical resistance of a silver conductive track, the assumption is to simply use a high EOM stencil which will give you a higher ink deposit (and therefore improve conductivity). Unfortunately, the downside of this approach is that it can dramatically reduce your process window for an in-spec print.

The reason for this is simple; you need to print with as low a squeegee pressure as possible to minimise image distortion for this printed circuit, but if you combine a low squeegee pressure and a thick stencil, the ink simply doesn't reach the substrate evenly, so you get negative sawtoothing. As a result you increase the squeegee pressure and the ink now fills the stencil, but you get image distortion and a thick edge to the print. The result is now a narrow process window between negative sawtoothing and image distortion.

BLOCK IMAGES

Using a high EOM stencil to produce a block image is not a solution either. In reality, a thick stencil merely gives you a thick edge. This is simply because the stencil has no influence on the amount of ink that's printed just a few mesh holes away from that edge. You can see this for yourself if you print a 2cm square with a high EOM stencil; the thick edge typically extends no more than 200 microns in from the edge. This is because the ink deposit in the centre of the square is determined by the mesh only and the stencil thickness has no influence, as the mesh is pushed down into contact with the substrate (the only exception to this is if you are using an ultra-high tension screen).

Thick edges to the print are a problem in many ways:

- First, if you are printing a conductive track they give you non-uniform electrical properties over the printed circuit as the conductivity is directly proportion to the cross sectional area of the track.
- Second, they will cause increased ink slump which can causing shorting with a circuit.
- Third, if you are not into printed electronics, thick edges can really mess up anything you print on top of them as their uneven topography guarantees to give uneven printing.
- Fourth, we've even seen examples where the thick edges destroy the inter-layer ink adhesion! Not a good thing for membrane touch switch manufacture.
- Fifth, and finally, they can look really ugly, especially when printing a back-lit transparent ink

So what is the answer? The simple answer is to use the mesh as the primary controller of the ink deposit and the stencil is there purely to control just the print acuity (resolution and definition). This can be achieved by using a thin and flat stencil.

It is straightforward to measure the EOM of your stencils by using a hand-held measuring device and this will take all the guesswork out of controlling just how thick it is.

Continued over

Hand-held measuring device

POSITIVE SAWTOOTHING

Positive sawtoothing is the classic defect that is present in so many screen prints. The ink spreads outside the line in a regular wavy pattern. We've all seen it a million times and it always comes from stencils that have an uneven print surface (high Rz). Fortunately it is also easy to measure roughness as there are several hand-held Rz measuring devices available, although these are a bit more expensive than the thickness measuring devices. Rz is easy to reduce by either using a stencil film or applying face-coats to an emulsion stencil.

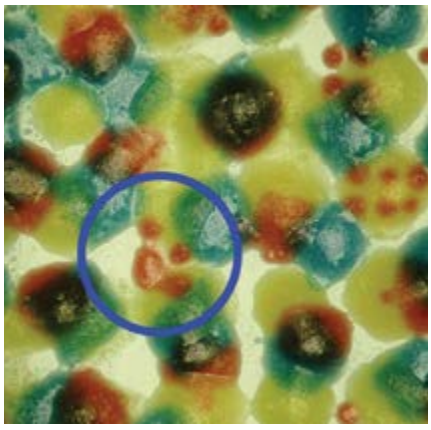
DOT-GAIN (SPREADING)

The main symptom of a high Rz stencil is that it automatically causes the ink to spread out under the stencil surface. Consequently the amount the ink spreads depends strongly on the amount of squeegee pressure used and ink viscosity, so it is almost impossible to control. For line printing you see this as a saw-toothed image, whilst in half-tone printing it manifests itself as dot-gain. To minimise dot-gain you have little choice other than to create a low Rz stencil to eliminate the problem at source.

However, don't be tempted to create a lower Rz stencil by building EOM with additional emulsion coats. This will lead to a bigger ink deposit which also spreads (slumps) more to give you dot-gain.

SKIPPING

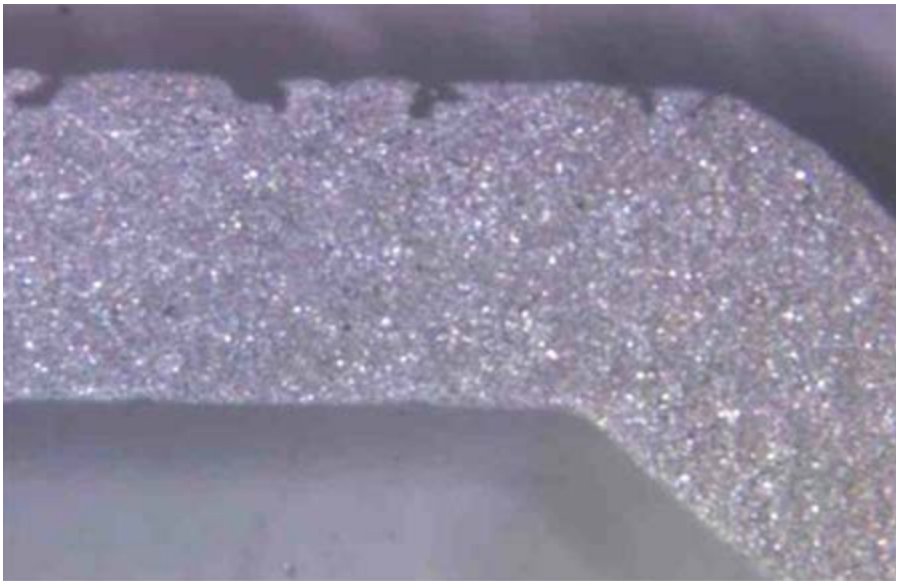
Skipping is typically a problem that occurs when printing four-colour process with UV inks (you have to be completely out of control to get this in a single colour!). We know that a high EOM = high ink build, and as UV inks are 100% solids they do not shrink when they are cured (wet height = dry height). Typically you will see skipping when you print the second, third or fouth colour in the set. Basically your stencil is sitting on top of a big mound of dots and the ink has even further to travel before it can reach the substrate. The squeegee pressure isn't high enough to force the ink down the extra distance caused by the previous dots. Therefore, when the stencil rises, it only leaves little dots where the ink touches the surface of the substrate, these can look like 'puppy paws' but is classic skipping.



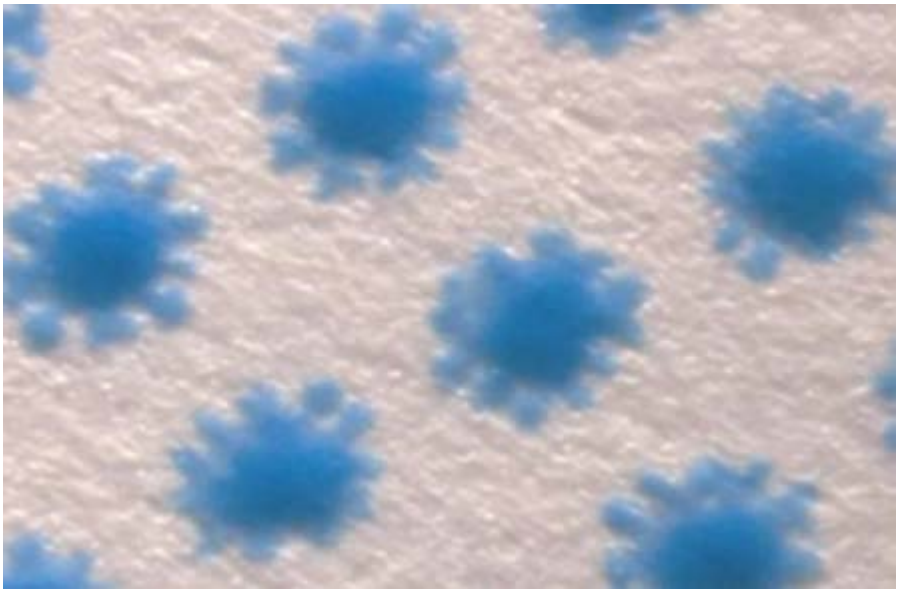
Classic ink skipping looks like 'puppy paws'

As the skipping fades in and out depending on where your new dot is with respect to previous dots, the skipping isn't uniform. To the uneducated eye it can look like moiré and the printer then wastes a lot of time trying to fix the non-existent moiré!

In fact, after classic mesh moiré, skipping is the single largest source of 'moiré' that we've seen. The industry solution is to increase the squeegee pressure, but this leads to ink spreading, loss of quality and resolution. The only way to resolve skipping at source is to ensure that your previously printed dots are as small as possible. You do this by using a fine mesh and a very thin, flat stencil which gives the minimum deposit.



Conductive track showing negative sawtoothing



A high Rz stencil gives large dot gain

SUMMARY

All too often in screen-printing, the solutions to print defects focus in on the symptoms not the root causes. Positive and negative sawtoothing, thick edges, dot-gain, process drift and skipping are all manifestations of the same problem; a mismatch between stencil thickness (EOM) and stencil roughness (Rz). Time spent in producing a thin flat stencil in production really can pay dividends. ■

This article was originally authored by Professor Steven Abbott who was R&T Director at MacDermid Autotype from 1992 to 2009

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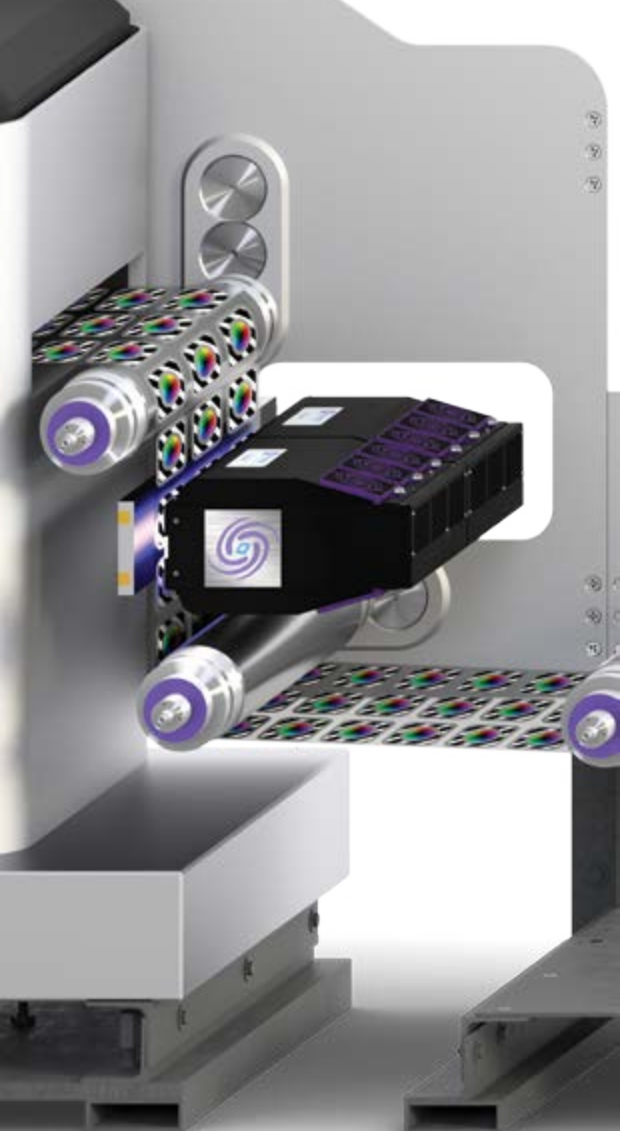

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THE BENEFITS OF ADVANCED PERFORMANCE MESH FOR TEXTILE PRINTING

Ross Balfour analyses today's versatility and scope in the screen-printing process

Monofilament polyester yarn used to weave screen-printing mesh has been steadily improved over the years, with new versions being introduced that display much higher modulus (high tensile strength with low elongation) than standard yarns.

These advancements in yarn technology allowed the development and introduction of a new generation of high tensile strength screen mesh, woven with thinner threads, that confers multiple practical benefits and advantages to the discerning textile screen printer.

A typical analysis of stress/strain curves, illustrated here for 55.48 (140/in) in Figure 1 below, shows the balanced elongation of both warp and weft directions of the weave, and low elongation of the fabric that's required to reach and maintain a high tension level. This balance means that at increased tension levels the mesh openings remain square and consistent throughout the screen. This is most critical for half-tone printing since we are putting a regular pattern of dots onto a fabric. If the fabric is not consistent in weave it can lead to moiré (this is only one of many causes of moiré).

The excellent mechanical properties of these yarns has allowed the introduction of a range of fabrics with much higher % of open area compared to standard fabrics typically used by garment decorators. The difference in both open area and thread diameter is illustrated below in Figure 2 that compares 120/cm mesh (305/in) and shows the difference between same mesh count woven with either 31 micron, or 40 micron yarn.

We can illustrate these differences in the Table 1 that compares an equivalent range of mesh counts typically used for textile printing.

The major printing benefits conferred by this new type of mesh result from a combination of the high % of open area, that enables better ink coverage, and also from the thinner threads, that allow finer detail to be printed.

Now let's look at both of these aspects in more detail.

COVERAGE

Figure 3 below shows a comparison of printed results from standard 77.48 (196.48) mesh (left) with thin thread 78.40 (198.40) mesh (right) and clearly shows the superior coverage when printing white ink on a dark garment. What is surprising here is that better coverage can be achieved with a lower ink film weight. Table 2 compares printed ink film weight for a standardised image, using different selected mesh specifications, and in each case you will see that printing with thin thread mesh consumes less ink than it's 'standard' counterpart.

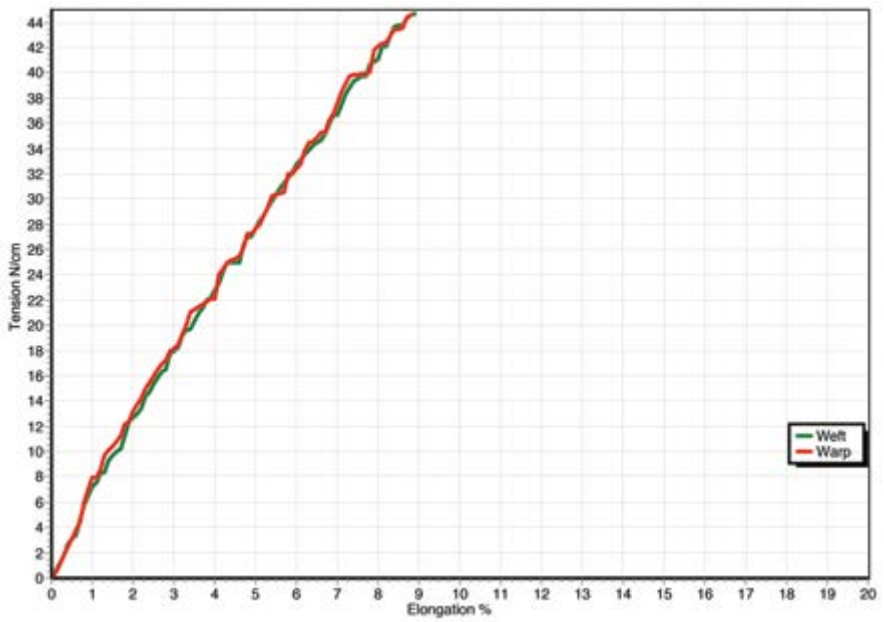

Figure 1 – stress stain curve of tension versus elongation for both warp and weft directions of mesh

Because ink is easier to transfer through the thin thread mesh by virtue of the thinner screen, and with high % of open area, much less squeegee pressure is required. This allows the ink film to be better managed and deposited on top of the substrate, where we need it, instead of being driven into it.

So, in addition to better visual quality of the image, the printed garment also has softer hand, by virtue of less ink used, but also including the smoother surface.

This superior coverage, but with lower ink consumption, is the result of a smoother and more continuous ink film. There are fewer voids, and less fibrillation, because garment fibres are less able to penetrate the ink film. The improved performance offers additional benefits beyond just better looking prints with

Continued over

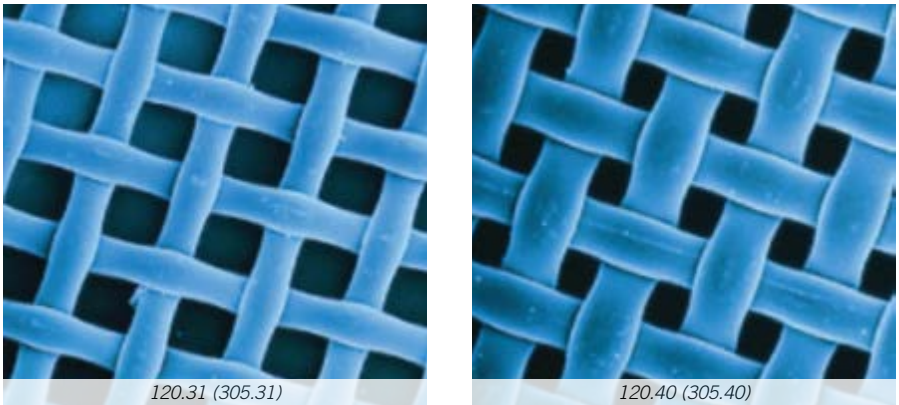

Figure 2 – comparison of thread diameter & open area for 120/cm (305/in) mesh

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Mesh Type	Mesh Count (c/m)	Mesh Count (in)	Thread Diameter	% Open Area
thin	32	81	70	61
normal	34	86	100	41
thin	43	110	64	53
normal	43	110	80	43
thin	48	122	55	55
normal	49	125	70	40
thin	55	140	48	50
normal	55	140	64	41
thin	64	158	48	56
normal	62	158	64	32
thin	78	198	40	44
normal	77	196	55	28
thin	90	230	40	38
normal	90	230	48	27
thin	120	305	31	40
normal	120	305	34	29
normal	120	305	40	20

Table 1 – comparison of thread diameter and % open area of commonly used mesh for textile printing

light inks on dark garments. Improved coverage with anti-bleed base also results in better inhibition of dye migration when printing on poly/cotton blends, as shown in Figure 4.

DETAIL

The second big advantage of thin thread mesh is much easier ink transfer when printing fine details, including half-tones. In addition to providing screen tension, that lifts the stencil out of the wet printed ink film after the squeegee passes, the mesh is also a scaffold that provides support for the detail in stencil image. Thinner threads provide a less intrusive scaffold, and result in less blockage and interference of fine details, and this is particularly relevant for highlight areas of half-tone prints.

Figure 5 shows the interaction between 10% half-tone dot on 55lpi image with the mesh. In the case of the thin thread 78.40 (198/in) mesh the stencil openings are much more open and free from obstruction. For the equivalent standard mesh 77.48 (196/in) there is considerable blockage.

Of course it's possible to create, calibrate, and use compensation curves. These are applied to the separated artwork and attempt to counteract this dot loss, and 'linearise' the tone range for the printed result. The process requires a 'compression' of the tonal range, that is transferred into the stencil during exposure, by artificially enlarging the effective size of highlight dots in the region of tone range that needs help. The greater the extent of mesh interference, the more extreme compression must be employed, in attempt to maintain a linear printed tone range with full highlight detail. When this compromise requires excessive use of compression, it makes the stencil exposure and printing process more difficult to control within strict limits, and requires careful management of all press variables to master successful multicolour half-tone printing. This is especially so for process colour printing, where control of 'grey balance' is critical for fidelity when overlaying the transparent process colour inks to create additional colours.

Thin thread mesh requires less aggressive compression of tones to linearise the printed result, and thus allows a greater degree of control and latitude in all steps that follow in order to achieve acceptable prints.

OTHER BENEFITS

Although this type of mesh offers substantial benefits to textile printers using any type of ink, the original concept was to develop a

Mesh Type	Mesh Count (c/m)	Mesh Count (in)	Thread Diameter	Measured Ink Deposit per m²
thin	43	110	64	29.7
normal	43	110	80	35.5
thin	48	122	55	28.7
normal	49	125	70	44.3
thin	78	198	40	13.1
normal	77	196	48	15.9

Table 2 – comparison of ink deposit

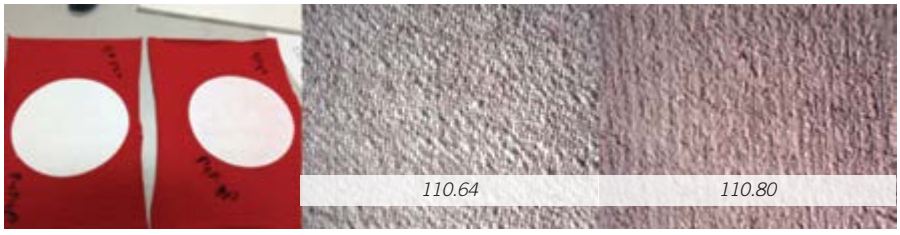

Figure 4 – comparison of dye migration of prints made with thin thread versus standard mesh (Picture courtesy of Eric Klein, Saati Americas Corp)

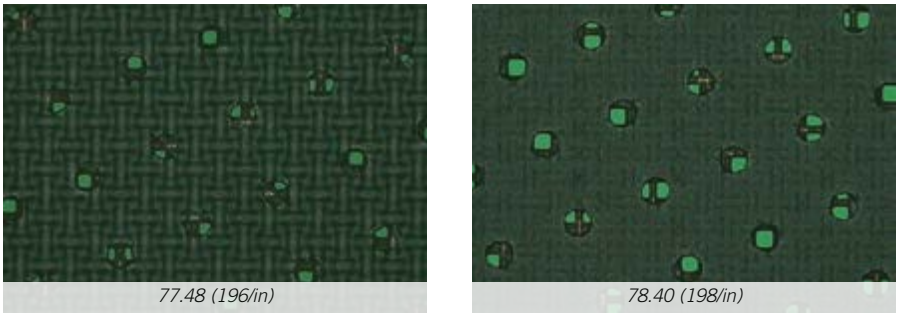

Figure 5 – mesh blockage obscures highlight dots

Figure 3 – coverage comparison (Picture courtesy of Allan Heller, Screen Creations, Mexico)

range of mesh specially designed for printers using water-based inks. The higher % open area retards premature drying, or at least makes rewetting easier after short print stoppage, and enables Plastisol printers to make an easier transition to water based printing. It's true that many top brands of water-based inks today have been improved in performance, so that premature drying in the screen is much less of an issue than in the past. However, the use of thin thread mesh, in addition to its previously mentioned benefits, also offers the advantage of wider process latitude when printing water-based inks under adverse environmental conditions, or when trying to limit the use of any added retarder.

Surface treated versions of thin thread mesh are also available, and these use a plasma based process to modify the mesh surface in order to promote extra stencil adhesion. The plasma treatment uses an ionized gas to raise the dyne level of the fabric. This promotes better wetting and encapsulation of the threads with wet emulsion during screen coating, as well as raising the adhesion level of the stencil itself, resulting in more durable screens.

CONCLUSION

Thin thread mesh offers textile and garment decorators an additional tool that further extends the versatility and scope of the screen-printing process. Practical applications could include using thin thread 78.40 (198/in), instead of 62.64 (158/in), to maintain ink coverage but with the ability to reproduce finer details. Or, single stroke printing with 48.55 (122/in), instead of print, flash, print with 49.70 (125/in), to get the same result but saving two open print heads. Consumers of printed garments and sportswear are becoming more discerning and demanding. The advances in printing capability offered with these new mesh types will allow manufacturers to continue to be creative in meeting their demands. ■

Figure 6 – better print results with thin thread mesh Picture courtesy of Allan Heller, Screen Creations, Mexico

Ross Balfour is Chemicals Business Unit Manager at SAATI

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DECORATIVE PRINTING ON FRONT PANELS

Salvatore Giuffrida looks at the ink options available for these applications

Touchpads and touch screens are very much part and parcel of our lives. In today's interconnected world, we communicate via smartphones, read novels on tablets, and use devices with sophisticated touch technology on a daily basis. And expectations are rising with regards to both functionality and appearance. There is growing demand for ever-more attractive user interfaces generally, and increasing use of touch screens on products such as household appliances.

HIGH-QUALITY PRINTING FOR DISPLAYS ON HOUSEHOLD APPLIANCES

Increasingly, manufacturers are incorporating input systems into front panels and panel inserts on household appliances such as washing machines, dryers, dishwashers, ovens, coffee machines, and microwaves. With growing frequency, the solution of choice is a capacitive touch interface.

The decorative inks used on these devices must demonstrate a high level of resistance to ensure the input system operates correctly. Unlike their resistive counterparts, capacitive touchscreens do not require mechanical pressure. The screen comprises a single plastic panel, rather than multiple layers, and is made of common materials such as PMMA or PC. However, glass is becoming more popular as a substrate as it offers many advantages – including a high level of resistance to scratches and soiling, as well as mechanical resistance.

PRODUCT AND COLOUR REQUIREMENTS

Household appliances make everyday tasks easier, but also are increasingly appreciated for their appearance. The materials and ink employed on input systems must therefore be attractive, and also capable of withstanding the trials of daily use. Inks must be easy to work with, be resistant to chemicals and high temperatures, have consistent batch-to-batch quality, and form thin films even when in multiple layers. They must also undergo various tests, such as low temperature, heat aging, water vapour and cyclic corrosion testing. Moreover, they must fulfil aesthetic requirements. These include crisp edges, smooth ink flow, white lightness (L value), colour co-ordinates (laboratory value), and high opacity.

Marabu has developed specially formulated shades of black with extremely high electrical resistance (such as the nonconductive Mara Switch MSW opaque black 181) specifically for front panels to ensure the reliable operation of input systems. Transparent varnishes, also known as diffusor or filter inks that are backlit by LEDs, are also available.

NEW SPECIAL-PURPOSE INKS FOR DECORATIVE PRINTING ON PANELS

Marabu's solvent-based and UV-curable inks are ideal for complex decorative printing tasks for input systems. Screen-printing offers a wide range of colours, special effects and functional layers for high-quality capacitive input systems. To achieve extremely high resistance and fulfil specific requirement profiles, the back of transparent plastic and glass substrates (front panels) can be screen-printed using one- or, if needed, two-component ink systems.

In this context, the Mara Switch MSW product line has a number of advantages. It includes new special-purpose inks that, unlike their predecessors, are not classified in reproduction toxicity category two. This means fewer workplace health and safety constraints for the appliance manufacturer. Moreover, the decorative inks can be blended to create custom colours. The Mara Switch MSW line is ideal for second-surface printing of the entire front panel, and also for diffusor and symbol printing. The new, specially-developed Mara Switch MSW 181 achieves excellent coverage on pre-printed inks (white, silver, black, colour, etc).

Marabu's highly-resistant, solvent-based two-component ink systems, Mara Glass MGL and Tampa Glass TPGL, are perfect for printing front and decorative panels in glass. If UV inks are required, the tried-and-tested Ultra Glass UVGO and Ultra Glass UVGL ink systems, as well as the special-purpose inks from the Ultra Glass UVG3C line, are ideal.

The Mara Switch MSW line is ideal for second-surface printing of the entire front panel

THE SOLUTION FOR INTRICATE DECORATIVE PRINTING

Use of UV-curable inks is steadily increasing across all segments, and input systems are no exception. The inks are solvent-free, and this has tangible advantages. They do not clog the mesh screen – making it easier to print intricate lettering and symbols. UV ink systems have very short drying times, resulting in higher production speeds and therefore lower costs.

Further advantages include compliance with thresholds for chemical concentrations in the workplace (MAK thresholds in Germany), and the environmental benefit of eliminating solvent emissions.

Structures combining UV-curable and solvent-based ink systems have also proven successful. In order to take advantage of the aforementioned benefits, letters and symbols on plastic panels are printed with UV inks from the Ultra Mold UVPC line. The subsequent blocking layer is created, for example, with the Mara Switch MSW line's nonconductive opaque black.

However, for plastic panels there is a clear trend toward using layers of inks comprising exclusively UV inks – as is already normal practice for glass panels. Against this background, Marabu is currently developing a UV-only solution for plastic panels. All defined requirements have been successfully fulfilled within the scope of initial tests performed with leading-name project partners. It proved possible to create a UV-only multi-layer structure for letters and symbols, including the final blocking layer. Marabu is looking forward to offering customers this new solution for plastic panels in the near future. ■

Salvatore Giuffrida is Technical Service Manager Screen and Pad Printing Inks at Marabu

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THE IDIOSYNCRASIES OF PRINTING SILICONE PRODUCTS

Joe Shairs offers application options and tips

Joe Shairs

There are plenty of items made of silicone around us. Among the very popular products that companies want to personalise nowadays are cellphone covers and credit card wallets (which people attach to the back of their cellphones), swim caps and wrist-bands for different causes.

There are also medical products made from silicone, such as prosthetics, masks and implants, which may need to be painted or marked. Another application is marking the silicone keypads used in aircraft instrument panels.

DECORATING OPTIONS AND INK TYPES

There are very few ink systems available on the market for silicone decoration. It seems that the only thing that sticks to silicone is … silicone. So all the available ink systems that I've seen so far are essentially liquid silicone, designed to be screen- and/or pad printed and requiring heat curing.

Most screen- and pad printing companies are accustomed to dealing with solvent-based or UV-curable inks. Silicone-based inks are very different, and I would like to share some considerations and tips for handling them successfully.

CONSIDERATIONS FOR PAD PRINTING

Unlike solvent-based inks, silicone-based inks always remain wet – that is until they are cured in an oven with high heat. There are several implications that concern pad size, pad cleaning, depth of plate etch and multicolour printing.

PAD SIZE

It's normal to have residual ink on the plate after it is doctored. Solvent-based residual ink will usually dry right away, before the pad could pick it up and transfer to the product. But silicone-based ink will not dry – so you need to select the smallest possible pad that can pick up your image (and not touch the residual ink).

PAD CLEANING

Silicone sticks to silicone, and there is a downside to that; the ink wants to stick to the silicone printing pad. With solvent-based ink, you get complete release of the ink almost all the time. But with silicone inks, you need to clean the pad after every four or five prints, otherwise print quality will suffer. You can wipe the pad with a lint-free paper towel/cloth or tape the pad off with sticky packing tape. (Some pad printing machines are equipped with a cleaning station, and you can program the pad to 'print' onto the tape and get cleaned, as often as you need. We at Inkcups have pad printer models with cleaning stations.)

DEPTH OF PLATE ETCH

Silicone inks tend to be more transparent than solvent-based ink. Plus, as mentioned, the silicone pad can't release all the ink. So the plate etch needs to be very deep to avoid potential problems with image opacity. The traditional depth of etch for printing onto promotional products is .001 inch. With silicone ink, we recommend .0015" or even .002".

ADVANTAGES OF SCREEN-PRINTING

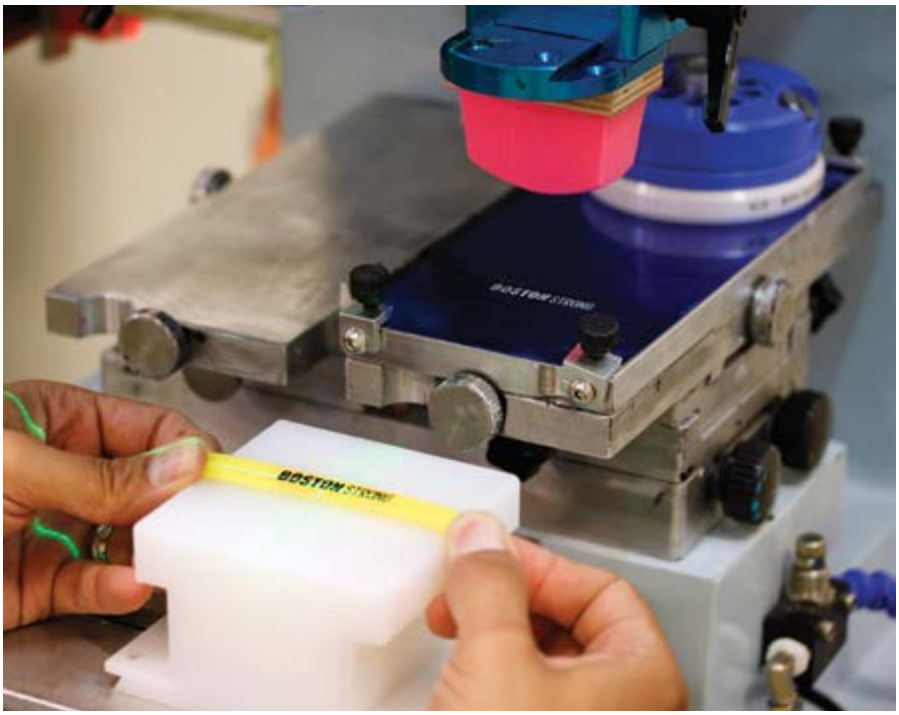
I like to see our customers screen-print on silicone instead of pad print, for a few reasons. First of all, you lay down more ink so the opacity of the print is never an issue. Second, there is no danger of overprinting (accidentally picking up residual ink and depositing it around the image). You have a screen with dots, and whatever comes through the dots, is your image.

Another big advantage is the option of printing in batches. Similarly to the loading templates that we offer for ink-jet printing, some of our customers have developed templates for screen-printing. They use the templates to put ten to 20 of the same product in the correct spots and print them with one screen at the same time, which dramatically increases productivity.

SPRAYING

Silicone ink can also be sprayed through an air gun. This is what is done for covering silicone products such as face masks and medical items with skin-tone colors. Inkcups offers special thinning oil to enable this application.

Continued over



A silicone wristband aligned on the fixture and pad printed

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AVOIDING HEAT AND FRICTION WHILE DECORATING

Things to avoid with silicone ink during printing are extra friction and heat. In a hot environment, the ink will get more viscous (thick). Conversely, low temperatures prolong the pot life of silicone ink.

When screen-printing, the squeegee speed may create excessive friction over the screen, and the ink may jelly up in the screen and start to set. This mostly concerns high-volume producers that run production at very high speeds. You can't avoid friction completely, but you should slow the squeegee down. (When pad printing, the ink cup speed does not affect the ink negatively.)

PLATINUM-BASED VS TIN-BASED SILICONE

Silicone can be made on the base of platinum or tin. Silicones with different bases are not compatible, and platinum-based ink will not stick to tin-based product.

Most silicone products that our customers encounter are made with platinum-based silicone (out of hundreds of applications, there have been only two where the product turned out to be made of tin-based silicone). If you are planning to decorate a silicone product, you may need to check product composition with the supplier.

HEAT CURING TIPS

How much heat and time is needed to cure the product depends on how big the graphic is and how much ink you are laying down. For SI silicone ink that we offer at Inkcups, we recommend starting with six minutes at 124 degrees C (255 degrees F). Some customers will be able to use a little less heat and time – but you will need to test your particular product and image internally. In my experience, wristbands require less heat/time and swim caps, more. If your product is coming out of the oven and the ink is smudging off, it needs more heat and/or time. When cured properly, the ink becomes an integral part of the product.

Silicone printed Boston Strong wristbands

You want to aim at the lowest heat and shortest time that does the job, not only for productivity reasons but also to avoid exposure to formaldehyde, which would pose health risks. Liquid silicone starts producing formaldehyde when heated to a certain temperature. For our SI inks it is 149 degrees C (300 degrees F). It is crucial that you ask your silicone ink provider what that temperature is for their ink formulation.

MULTICOLOUR PRINTING CONSIDERATIONS

Most people print one-colour images onto silicone. Multicolour jobs become very cumbersome because you have to completely cure one colour in the oven before printing another. If the registration of the second colour needs to be very precise, it adds another layer of challenge, especially with pad printing, where your tooling fixture becomes critical. With screen-printing, I've seen customers achieve good registration by using templates.

SI INK SYSTEM FROM INKCUPS NOW

Our SI is a platinum-based two-component system. It consists of ink and catalyst (hardener). The pot life of SI is much more user-friendly than that of solvent-based inks. Once you add the hardener, you have 24 hours or more to use that ink (solvent-based ink, once mixed, lasts for six to eight hours). To extend pot life even more, some of our customers store the mixed ink in the refrigerator overnight and in this way use the same batch for over two days.

SI is a very safe product. It has little to no odour. It passes compliance tests such as CPSIA with flying colours. In addition to numerous variations of promotional products, SI is actively used in medical applications, such as marking breast implants and colouring artificial skin to make it look natural.

SI comes in 18 stock colours. We also offer a twelve-colour mixing system with a calculator for colour matching so the customers can create Pantone colours in-house. Technicians like myself are standing by to answer any questions and help you be successful with printing on silicone – or virtually any other substrate for that matter. ■

A printed silicone swim cap, bracelet and spatula

Joe Shairs is Ink Technician/Compliance Coordinator at Inkcups Now Corporation

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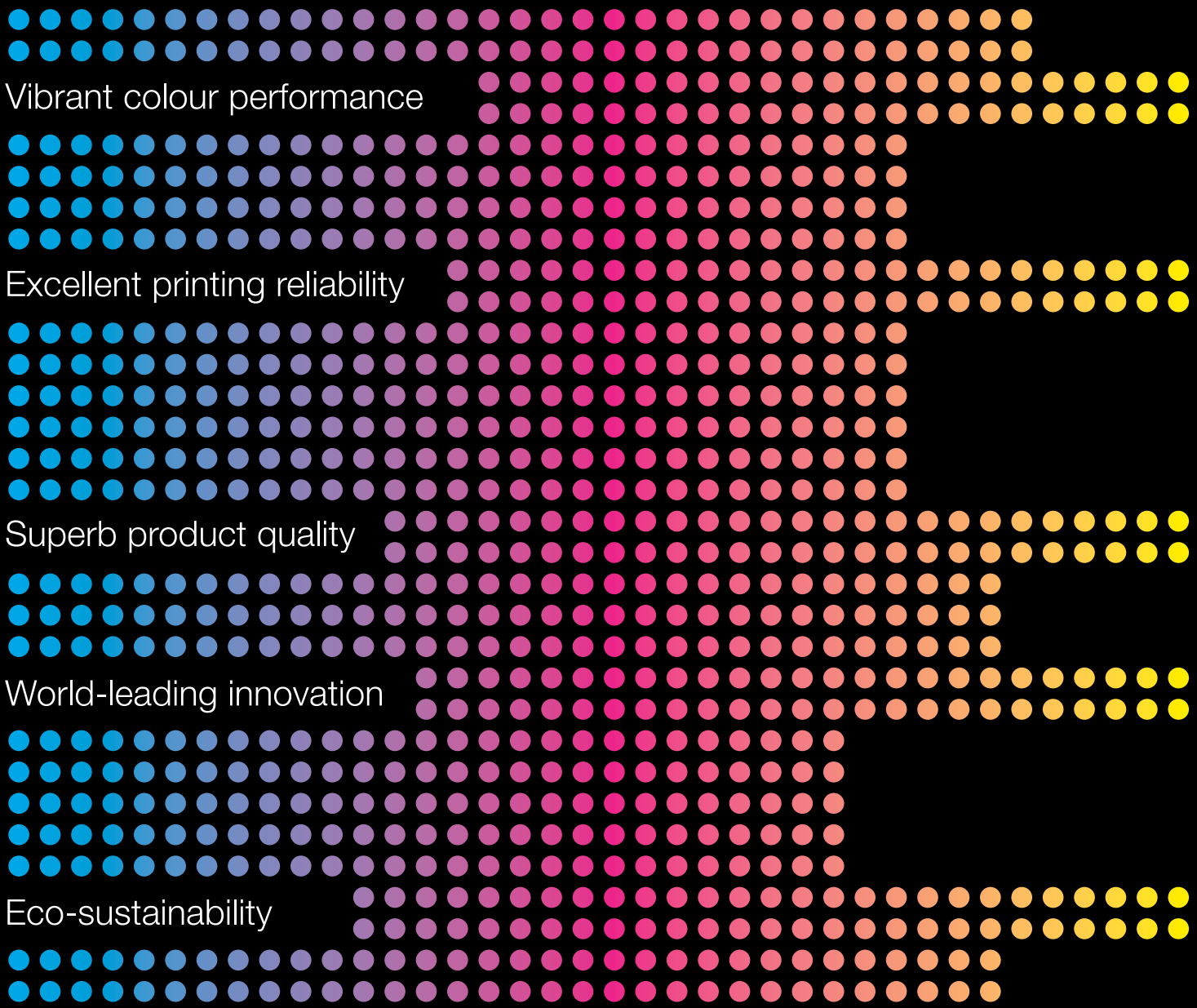

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KEEPING WITHIN THE CONTROL GUIDELINES IN NARROW WEB UV FLEXO INK PRODUCTION

Deepak P Gupta describes how smaller ink producers can avoid the problems of migration

Print and packaging has undergone some monumental changes in the last decade. None is more game changing than the irresistible move towards chemical migration compliance in the field of primary and secondary food contact legislation.

This move, allied to the increasing dominance of radiation curing as the preferred drying method in the narrow web sector, has led to major strategic changes in formulating techniques.

The subject of chemical migration hit the international headlines in a big way in 2005 with the discovery of dangerously high levels of a commonly used photoinitiator in infant formula milk. This was supplied by a prominent multinational food producer, leading to a world-wide restriction on the use of the initiator concerned.

Although it later emerged that the main cause of this problem was in fact a processing failure, and not the normal minimal migration which inevitably occurs within the packaging cycle, this event triggered a seismic shift in the printing ink sector. It generated a higher level of compliance regulation than had been hitherto witnessed.

STRICT CONTROL

The formulation and control of printing inks is now strictly controlled within Europe, at any rate by The Swiss Confederation's Ordinance of the FDA on articles and materials RS 817.023.21 Annex 6. This contains a series of lists of permitted substances for the manufacture of packaging inks, these lists being separated into parts A (evaluated substances), where migration into food is permitted up to levels of 50ppB, and parts B (non-evaluated substances), where the limit is set at 10ppB.

Imagico uses wet grinding and dispersion equipment from Dyno-Mill ECM-AP machines from WAB

This matter is further supported by the members of EuPIA – the European Printing Ink Association. This association issues approved 'Guidelines on the Formulation of Printing Inks for Food Packaging'.

Despite these stringent controls accidents still happen, as with the 2005 debacle. Thus the pressure on printing ink producers continues to escalate.

In the case of the larger ink producers that are equipped with the machinery and mechanisms and also the well-staffed compliance departments, this process is manageable. However, where the ink producer is smaller, and unable readily to fund the necessary equipment and personnel to deal with the problem, this becomes a serious issue.

MINIMISING THE PROBLEM

Imagico of Mumbai in India has developed a system to help the smaller ink producer to minimise this problem, and to confidently enter the arena of low migration narrow web UV flexo ink production.

This system comprises a series of nano-pigmented dispersions, based on high concentrations of single pigments in low viscosity diluents which, when blended with a new UV curing binder system using SCR (self curing resin) technology, results in a finely dispersed low viscosity finished ink, which cures fully, whilst simultaneously 'locking in' the photoinitiator molecules.

This 'lock-in' polymer mechanism thereby restricts, and even prevents, the tendency for these smaller photoinitiator molecules to migrate through the polymer matrix to the interface between the ink film and the food contact surface of the pack.

The ImagiFLEX system enables finished inks to be manufactured easily and economically, without the need to add large amounts of traditional small molecule photoinitiators, (currently typically added at levels of between 5 and 15%) to pigmented systems.

Basic dispersions are manufactured by Imagico using high quality precision engineered Swiss-built bead milling systems

DISPERSION MANUFACTURE

The basic dispersions are manufactured in Imagico's state-of-the-art facility in Mumbai using high quality precision engineered Swiss-built bead milling equipment. It is quality controlled to the highest standard by Imagico's team of experienced printing ink engineers, delivering finely and uniformly dispersed inks in a wide range of colours.

The ImagiFLEX system comprises a range of mono pigmented bases in CMYK shades, also corresponding to the internationally recognised Pantone matching system. The system also contains a short range of let-down vehicles, photoinitiators, stabilisers and surface modifiers, enabling the ink to be designed for suitability to a wide range of differing substrates and applications.

It is also supported by a starting formula matrix, and a comprehensive troubleshooting guide. Imagico's technical team are on hand to provide on-line and telephone technical service.

ImagiFLEX bases and additives can be used to formulate UV curable flexographic inks which will print and cure at the low cell volumes demanded by todays ultra-fine CO_2 and YAG laser engraved ceramic anilox rolls. ■

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TACKLING CURING CHALLENGES IN THE WIDE-FORMAT INDUSTRY

Ben Woodruff summarises the benefits of LED UV technology

It could be argued that the evolution of printing has shifted again, with the arrival of LED printers into the wide format arena. Requiring no warm-up time, generating no heat and, ultimately in some instances, using up to 35% less energy than a mercury lamp printer, they are an attractive proposition for many printers.

However, what does this mean in real terms? With many printers potentially looking to step into the arena of wide-format or seeking to broaden their printing repertoire, the combination of lower running costs with extended lamp lifetime makes LED printing an appealing option. The less heat generated means an even wider range of rigid media can be printed on without the risk of deformation, melting or curling, plus LED brings an array of different printing techniques, which are bringing a new edge to standard flat colour printing.

EXTENDED LAMP LIFE

InkTec's Jetrix LX5 LED UV flat-bed printer with optional roll-to-roll delivers all of this, including extended lamp lifetime of up to 20k hours, by using six picolitre Konica Minolta print-heads. Combined with competitive printing speeds of 39 square m/hour in production mode to 11 square m/hour for precise fine art printing, it can create the combination of superb printing quality and high productivity. Available with a four (CMYK), six (CMYK plus two white) or seven channel (CMYK plus two white and one varnish or primer) colour configuration, and driven by InkTec's specially formulated UV inks, the Jetrix LX5 delivers a wide colour gamut, high colour vibrancy and fast ink curing abilities.

The result is achievable fine detail with razor-sharp text, as small as 2 point. Working closely in conjunction with the Jetrix anti-banding technology (G-mask) photorealistic printing is delivered, while the sophisticated flat-bed and vacuum system offers automatic control of the two different vacuum zones to ensure substrates are held completely flat when printing.

USER FRIENDLY INTERFACE

Also answering the need for ease of use, the advanced and user friendly GUI software focuses on creating a system that simplifies, optimises and automates as many steps as possible. This includes the ability to 'drag and print' and have pre-set media file formats stored, so pieces regularly printed don't require setting up each time. Sticking to this simple-to-use priority, the Jetrix LX5 can be filled on the fly to reduce the need to pause projects and also comes with a range of automatic convenience functions including cleaning, media measurement, anti-crash systems and optional anti-static system.

Driven by InkTec's specially formulated UV inks using the highest quality pigment grades, the LX5 offers a wide colour gamut, high colour vibrancy and fast ink curing, to extend a customer's printing capabilities. Accelerated weathering tests on different substrates indicate the outdoor durability is more than two years under normal climatic conditions, ensuring long-term outdoor applications.

COOL TEMPERATURES

The cool temperatures also mean the Jetrix LX5 can also create textured printing, by adding raised layers and contours to any image, plus users don't need to prepare the artwork any differently. So, how does the Jetrix LX5 deliver this? A critical element is down to the software which, by selecting the 3D texture printing function, is able to adjust its print passes to gradually raise the print-head in increments.

The amount of layers of texture to apply can be chosen – two, three, four or five layers with CMYK bottom and top or, alternatively, to boost colour density a white layer can be added, plus four other layers to give even more intensity to the output. This technique offers some interesting application opportunities, including bespoke pieces, fine art, premium signage and specialist wall coverings.

AFFORDABLE LED TECHNOLOGY

These good all round machines can print on a maximum substrate thickness of 100mm and are equally capable of printing on Foamex PVC, acrylic, glass or any other rigid media. The need for affordable LED technology in the wide-format

Continued over

InkTec's Jetrix LX5 LED UV flat-bed printer has a roll-to-roll option

An example of textured printing. Textured 3D printing achieved by incremental raising of the print-head on each pass

Inside the Jetrix LX5 LED UV printer

sector is long overdue and the Jetrix LX5 illustrates how the numbers can now really stack up. By directing energy more efficiently and reducing the overall power consumption, the total cost of ownership over its lifetime makes it a realistic and affordable option. This is all wrapped up with the added reassurance of all the design, technology and precision familiar with any of the current Jetrix printer range, plus the active service support that InkTec offers. ■

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THE MAIN TOOL FOR SUCCESSFUL SCREEN-PRINTING

Alan Buffington discusses efficiencies in job production

Screen-printers have a wide choice of tools they use. From automatic and manual presses in a variety of shapes and sizes along with the screen mesh and emulsion used, there are many 'tools' we use to print with. Improving productivity in the work-place requires finding the best tools for the employees. We may have all experienced the two scenarios described below that illustrate that the screen determines so much about productivity and print quality that it should be the first tool we improve.

Employees shoulder the extra work and effort to complete jobs that are difficult to keep running with screens and emulsion that under perform. The extra labour effort used to 'fix' stencil breakdown and loss of register is costly to your profits and the morale of your shop. Labour is the most expensive component and is a substantial investment in time, training and knowledge. The skills the workers learn need proper tools for them to excel at their craft.

Consider these two print scenarios:

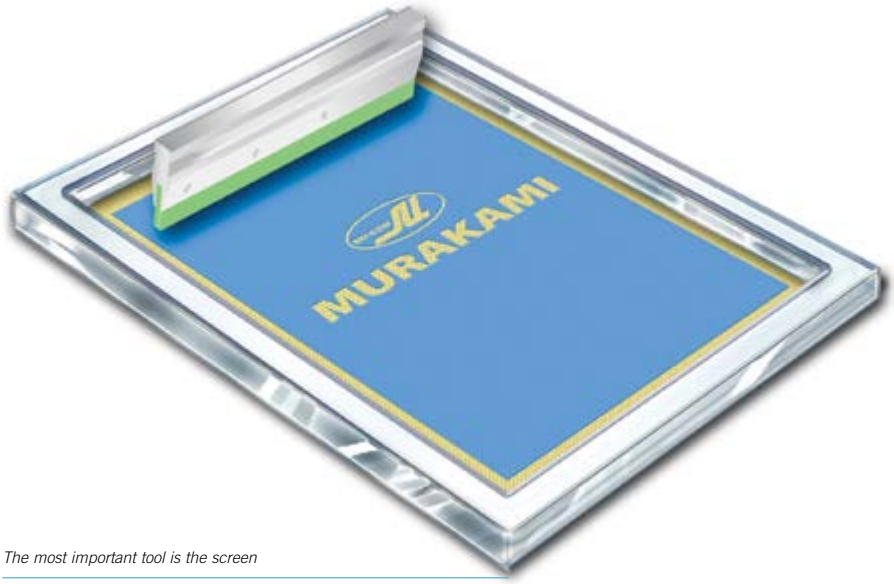
SCENARIO 1

It's Tuesday and the shirts have just arrived for a large order due Friday. The production manager looks at his schedule and there is just enough time to print the job and get it shipped by the deadline for an important time sensitive event. The client wants a soft hand print with a discharge base and plastisol over print instead of the usual all plastisol print. The screen room rushes the screens through exposure and development then blocks them out and rolls the cart of screens to the press. The lead man starts the set-up and finds he has to be careful with registration due to low tensioned screens. After 30 minutes of adjustments he approves the print.

Pallets are pre-heated by cycling the press with flashes on until the temperature equals that used during previous production

Less than 200 prints in the discharge screen breaks down – a quick tape-up of the break-through area and then back to production. Another 200 prints go by before the bubble of ink under the tape explodes. The discharge base plate needs a new screen. The screen room quickly exposes and preps the screen and rushes it to press. However, the tension on the second screen is less, which requires repeated press adjustments to get the design back into register. Many test prints later production starts up again. After 200 pieces the new screen breaks down due to a screen that wasn't dried completely before use and was coated with an emulsion that has limited durability. At the end of the day the production manager sees that four hours into production he has 600 pieces printed and at this pace he is behind schedule to make Friday's delivery.

He is forced into asking the screen room manager to stay late to make several base plates and schedules overtime to meet the deadline. The next day after washing the bottom of the plastisol screens he discovers they have become tacky and are lifting shirts off the pallet and causing misprints. He orders another set of plastisol screens from the screen room. They have been so busy shooting more base plate screens and other work that reclaiming has fallen behind. Screens now need to be reclaimed, coated and dried as quickly as possible so they can have screens ready for the press. Emulsion dry times are ignored; screens are being exposed as soon as they are dry to the touch. The emulsion has not dried completely on the inside of the emulsion coating causing the screens to break down quickly once again. The manager looks at the numbers, his reject rate is at 4% and not the usual 0.1 to 0.2%. In the end the company will be lucky to break even on this order that took the majority of the week on one of three presses. His reject rate is high, his print quality varies throughout the print run, and his labour costs are eating up any profits.



The most important tool is the screen

SCENARIO 2

The deadline is the same as above for a 3,000 piece run. The schedule is tight at three days with folding and bagging. The print again is a discharge base with plastisol over print for the colours. He instructs his screen room to prepare the screens immediately upon receipt of the PO and shirts so that they have adequate preparation and drying time. He has chosen an emulsion that is resistant to water base and discharge inks like Murakami T9. The press is preparing the blanks for printing;

stacking them for easy loading; obtaining the inks and cleaned squeegees and reviewing the set up sequence. The screens are the last item to arrive since the screen room has been trained not to release screens without adequate dry times, adequate post exposure, and using the correct emulsion for the job. They are still warm from being in a drying cabinet.

The press workers find registration is easy with well-tensioned screens stretched with Smartmesh. The test prints look flawless, with just some minor squeegee adjustments to obtain a bit more colour, some minor tweaks to the registration and, in less than 15 minutes, they are starting production. The first hour yields 300 pieces/hour after set up. By the second hour they hit their target of 500/per hour and are running at a steady pace with minor fixes to remove thread and lint from the design. The crew is well trained. An ink tender keeps fresh discharge ink in head one and activates only what he needs for an hour's worth of printing.

The ink tender, floor lead man, or any nearby worker helps keep the cart full of shirts to help the loader keep the press running. Helping hands in screen-printing make everyone's job easier.

The discharge screen is holding. There is no breakdown of the emulsion due to an excellent emulsion choice and proper screen making procedures. The mesh is holding tight registration on the sim process job. At the end of the first day they have 1,200 pieces finished. The reject rate is less than 0.1%. The discharge screen is still strong enough to withstand a hot water cleaning to make sure the mesh is open for the start of production in the morning.

The following day the pallets are warmed up and a half dozen test print shirts are loaded to check registration as the lead man walks around the press following the print sequence. After the third good print reaches the unloader station he signals to the crew to start printing the shirts. By the afternoon the job is complete and packaging takes over to finish the job in time for pick up on Friday.

The difference is that Scenario 2's success was achieved by choosing an emulsion that could withstand the ink systems commonly used today and high quality mesh to create the most important tool – the screen. When workers use tools that perform, the job is more rewarding and enjoyable. When the only way to get a difficult job out is excessive labour, screen changes, and stressful deadlines to overcome with tools that don't work, the employees job is a continual struggle. Retaining well-trained employees with skills that only happen over many, many jobs is necessary for company growth. Well performing screens allows them to concentrate on great prints and not an endless cycle of fixing screen issues.

I have lived both scenarios as a production manager and an owner. The stress created by poorly performing screens becomes a production headache and greatly affects employee morale. The goal of any shop is to make money and only Scenario 2 above fits that goal. Your skilled employees are your shop's most valuable asset. Good production managers and press personnel deserve the best tools to make the job obtainable and not impossible.

The mesh used in Scenario 2 exhibits the following qualities:

REGISTRATION

Good quality mesh like Murakami Smartmesh sets up faster, holds excellent registration during production, and will continue to print downline on many more jobs than using a mesh that loses tension quickly. Simulated process needs dot-on-dot registration capability for the life of the print run. Vector art needs precise registration to cover base plates or to line up precisely without overlap during printing. The most important tool in your shop deserves the best mesh.

TENSION

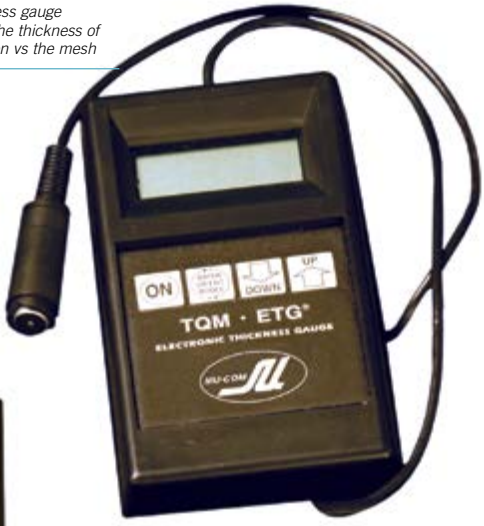
Each mesh count has a specific range of tensions that is recommended by the manufacturer for optimum performance. One of the main values of quality mesh is its ability to retain tension. The screen could be looked at like a finely tuned musical instrument.

Continued over

MEASURING TOOLS

The moisture meter determines the dryness of the emulsion

The tension gauge is used to determine mesh tension in newtons



The thickness gauge measures the thickness of the emulsion vs the mesh

When the strings of a guitar are tightened to the proper tension it will be in tune and sound great. When the threads of a screen are at the proper tension it will print well, but lose tension and the screen, like an out of tune guitar, will not perform well.

LOW ELONGATION

This refers to a mesh thread's ability to avoid elongation which causes a loss of tension. The quality of the mesh thread to resist elongation helps it to retain tension, hold precise registration, and prints many more jobs over the life of the screen.

A heated screen drying cabinet

ACCUMULATED ELONGATION

This refers to the mesh warming up during the print run. After many prints go by accumulated elongation will make registration more difficult. Mesh needs to not only retain tension, but resist the force of the squeegee continually pulling on the mesh during production. The number one goal of all press operators is to keep production flowing. Non-stop production is very difficult to do if the mesh is warming up and relaxing during the print run.

INK DEPOSIT

Screen-printing is a unique process that can print a myriad of ink choices. Unlike any other print trade the viscosity and type of screen-printing ink can range from coarse glitter inks to textile inks to UV graphic inks to precious metal inks costing tens of thousands of dollars a gallon. The micron readings of the mesh openings can range from 768 microns (glitter inks) on a 25 TPI (10cm) mesh down to a 28 micron opening on a 460/27 (180/27 metric). This is the most unique feature of screen-printing; our screens can print a multitude of inks that digital and offset cannot print.

For the print examples above in Scenario 1 and Scenario 2 the amount of ink the discharge screen deposits can determine the intensity of the colours that follow. If the mesh count and thread diameter changed the discharge effect would vary in colour intensity. So repeatedly changing screens that have failed can introduce different mesh openings, tensions, and counts that can affect the discharge intensity.

If plastisol ink is substituted for discharge in the base plate using a 150/48 or 225/40 (59/48 or 90/40 metric) mesh will use much less ink – 39 to 53% less ink depending on the mesh count. That is a huge ink savings over a year and the print will have a softer hand than using a 110/80 (43/80 metric).

EMULSION MAKES A DIFFERENCE

The emulsion in Scenario 1 above often occurs when the emulsion cannot withstand the ink system. Murakami has new emulsions that require no hardeners to print water base, discharge, and high solid acrylic inks. Proper screen making requires:

- Good coating technique to yield 10 to 15% EOM (Emulsion Over Mesh)
- Adequate drying time in a humidity controlled environment, less than 50% humidity.
- Complete exposure – the entire emulsion film is exposed. Quality emulsion can still image fine details at full exposure to create a durable screen.
- The screen is dried completely before going to press. Use a drying cabinet at 38 degrees C (100 degrees F) or the sun to completely dry the screen before production

When you use quality products that perform, your competition can't duplicate your print skills when they use inferior products. The components of print success involve the entire chain of events from pre-press to screen making to printing. Good screen making skills with screen products that perform are a significant competitive advantage. After all – we are screen-printers. ■

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THE VERSATILE MAGIC OF FIBRES

Holger Walter explains the technique of flocking

Flock can be applied to virtually all base materials. The surface is characterised as velvety or brush-like in appearance and feel. Depending on the application, it features various technical and optical advantages. The flocking technique itself is not a new method of decoration. However, new and interesting applications continue to be found, sometimes by combining different decorative techniques.

WHAT EXACTLY HAPPENS IN FLOCKING?

A substrate coated with adhesive is flocked using electrostatic charging with synthetic fibres. The flock fibres are short, cut monofilaments of polyester, polyamide and viscose. Millions of these fibres are injected in an electric field into a substrate coated with adhesive. The electromagnetic field lines align the fibres more or less perpendicular, and so give a uniform velour surface with a textile character.

This type of surface coating can be extremely resistant, even to the actions of a dishwasher, washing machine or as a robust surface finish for floor mats.

An example of the effect of flocked textiles

FLOCKING PARAMETERS

In general, flocking is done in one colour, but can also be multi-coloured for flat products. Standard screen-printing machines can be used for flat or object printing; only the mesh type (if one can classify fabrics of 21 to 43 threads/cm as fine) must be adjusted for the adhesive application. For textiles, a coarser screen is advantageous, in order to apply the maximum adhesive coating to the textile substrate. For paper flocking, including wallpaper, finer mesh fabrics are preferential.

To permanently anchor the synthetic fibres in the adhesive, a certain coating thickness is required, according to the technical theory about one-tenth of the length of fibre in the dry state. The fibres needed are obtained in different decitex specifications and lengths.

For a better understanding: the decitex value indicates the weight of fibre in 10.000m lengths. For example, 0.9 dtex = 0.9 gr/10,000m. A further reference value is the length of the fibre in mm. The smaller the dtex value and the longer the fibre, the softer the coating feels. However, finer fibres are also more prone to abrasion or pressure

Flocked bathroom scales

Plastic cars show the versatility of flocking

loading than thicker fibres. Similarly, flocking parameters can be adapted to the fibres, according to the respective manufacturer's information brochures or technical advice.

In summary, the longer and thinner the fibre, the softer the surface; the shorter and thicker, the more brush-like. So the first visual and tactile effects can already be achieved through selection of flock fibre length and thickness.

DESIGN POSSIBILITIES OF FLOCK

The choice of flock fibres already influences the design or functional effects. The question whether to flock or to print does not arise, as the combination of both decoration processes can result in completely new design possibilities. Flock can be printed; flock can be structured by laser with extreme fineness.

With a low coverage of flock fibres, the background surface shines through. Hence this special effect can be used.

Whether as a purely visual design variant or as a functional surface, the flocking technique is available for users to explore new and unique design possibilities. Whether as anti-slip coating on bathroom scales made of glass, or insulating the surface for tea mugs, enhancing annual reports, book bindings or invitation cards, or decorating a T-shirt or jersey, a great variety is possible.

ADHESIVES FOR FLOCKING

Adhesives available to finishers are made up of different systems, such as solvent-based, water-based or one- and two-component adhesives. Depending on the substrate texture and requirement, adhesives must be selected with regard to their use. The development and production of flock adhesives is one of the core competences of KIWO - Kissel + Wolf GmbH. As a manufacturer of chemical products, Kissel + Wolf offers solutions in the fields of adhesives, screen and textile printing products, cleaning chemicals, resists and coatings and services in product development and contract manufacturing.

MECOFLOCK D 404 is a screen-printable two-component dispersion-based flock adhesive for direct motif flocking on fabrics. It is suitable for manual screen printing and processing on automatic screen-printing carousels. Depending on the textile substrate and flock varieties used, after the crosslinking of the adhesive, the flocked surface is characterised by its very good washing and dry cleaning resistance. The adhesive can be dyed in the flock colour to achieve a uniformly brilliant finish.

MECOFLOCK D 585 WFP is a dispersion-based, screen-printable, one and two-component flock adhesive, especially for paper flocking in the gift, greeting card and packaging fields.

MECOFLOCK D 590 is a dispersion-based, two-component flock adhesive, especially for flocking glass and ceramic substrates. It shows good fastness, good dishwasher resistance and good resistance to common household cleaners and chemicals. ■

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BRINGING 2D INK-JET INTO 3D FORMING APPLICATIONS

Don Sloan and Mike Plier discuss the use of monofunctional, low-crosslinking and heat-stable UV-curable inks

UV-curable ink-jet printing is one of the predominant imaging platforms in wide-format graphics production, thanks to the health and safety advantages they offer over solvent-based inks, their high productivity with nearly instant curing and superior adhesion, and the compatibility they offer with a broad range of media. But some of the properties that make UV ink-jet such an attractive option also impose limitations in ink-jet's technical capabilities. By carefully altering the formulations used, UV ink-jet has many potential uses as an alternative to time-consuming, manual decal decoration and airbrush painting in industrial thermoforming applications. (Figure 1.)

While the market potential for converting these types of applications to digital printing is attractive, the status quo in ink-jet ink development emphasises difunctional, high-crosslinking acrylates that cannot withstand the heat, pressure and elongation needed in the thermoforming process.

By carefully examining the role monofunctional acrylates can play, the industry can develop a potentially important new niche for custom printing of industrial and packaging products using inks that can withstand superior elongation under high-heat thermoforming conditions. Monofunctional acrylates enable UV ink-jet inks to be flexible enough to meet or exceed the percentage of elongation possible with the underlying substrate. Rethinking the colour pigmentation process, augmenting inks to develop process colours that don't change under heat and don't fade when stretched, helps to complete this important technical innovation.

This article will highlight the essential development concept behind this new type of highly flexible ink – a patented formulation EFI acquired in 2014 and uses in its VUTEk GS Pro-TF products.

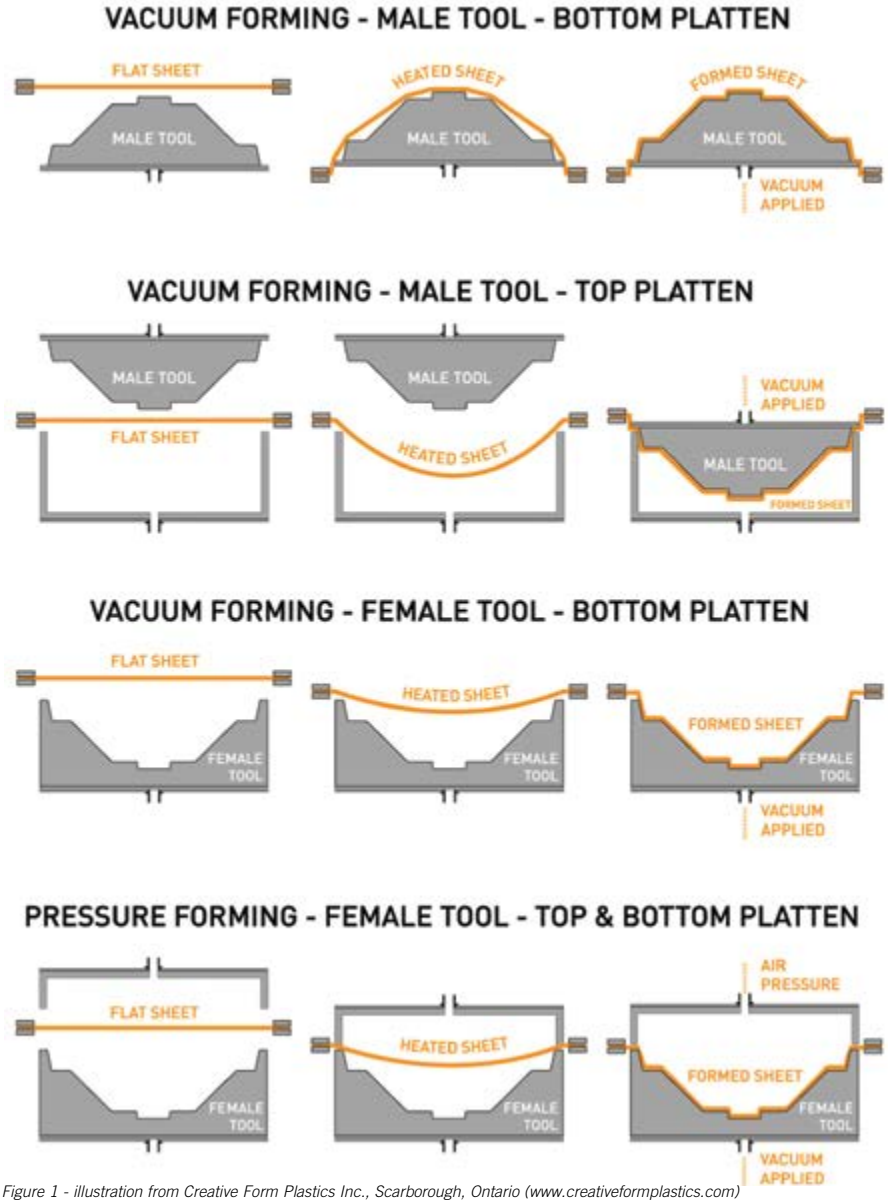

Figure 1 - illustration from Creative Form Plastics Inc., Scarborough, Ontario (www.creativeformplastics.com)

PLIABLE FORMING TEMPERATURE

Thermoforming is a manufacturing process wherein a plastic substrate is heated to a pliable forming temperature. It is then formed to a specific shape using a mould and trimmed to create a product or package. Substrates can be thin-gauge (for disposable cups, containers, lids, trays, blister packs, clamshells and other products used in the food, medical and general retail industries) or thick-gauge (for items such as vehicle doors and dash panels, refrigerator liners, utility vehicle beds and plastic pallets).

Thermoforming, then, is a type of vacuum forming process that requires heat and pressure. Standard heat applied in the thermoforming process is in the 137.8 to 238+ degrees C (280 to 460+ degrees F) range. The type of mould or tool configuration used depends on the specific product or signage needs or applications.

Every single one of us comes in contact with thermoformed products almost every day of our lives. Here are just a few examples:

- Aeronautical: Interior trim, covers and cowlings.
- Agricultural: Trays, tubs, clear growing domes, lawn mower enclosures.
- Automotive: Wheel and hub covers, auto interiors, deflectors, dash clusters, sports and outdoor vehicle cowlings.
- Marine: Boat hulls, canoes and kayaks; hatches and dashboards.
- Electronics: Handhelds, appliances, computers, instrumentation.

Continued over

DIGITAL TEXTILE INKS

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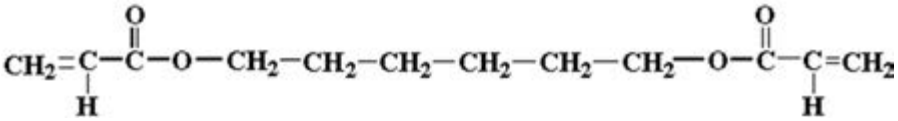

Figure 2 – Difunctional structure for Hexaneidiol Diacrylate (HDDA), a reactive diluent used in flexible, energy-cured inks and coatings

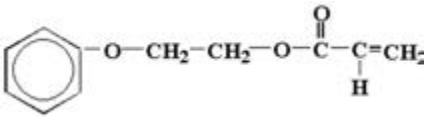

Figure 3 – Monofunctional structure for Phenoxyethyl Acrylate, commonly used in energy-cured inks and coatings

- Entertainment: Backdrops, costumes, animation models, simulations, gaming kiosks.
- Medical: Scanners, masks, prosthesis parts.
- Architectural: Tub and shower enclosures, jacuzzis, custom counters.
- Retail: Packaging, blister packs, signage, vending machines.

GENERATING INTEREST

Increasingly, brand owners, retailers and others are interested in using this technology to create 3D point-of-sale signage, gaming kiosks and products such as car-top carriers and more, in full-colour and in smaller quantities than conventional manufacturing processes have allowed. In a typical example using conventional thermoforming processes, it might take 7.5 hours of labour to produce two 13.5 x 4ft vacuum formed signs using current printing and painting processes. What if that time and cost could be significantly reduced?

Enter wide-format ink-jet. As with any digital printing process, wide-format ink-jet allows runs as short as one for fast-turn, highly customised materials for both samples and final product. Using digitally printed thermoforming technology, 34 of the same signs described above can be produced in the same 7.5 hours – a reduction of 93% in labour costs and an increase of productivity of 95%. Using conventional processes, these 34 signs would have taken 3.5 weeks to produce.

It is for this reason that digital printing technologies are attractive for thermoformed products. However, the inks used in digital wide-format ink-jet printing have heretofore been inappropriate for these applications.

UV INK-JET INKS: THE STATUS QUO

Thermoforming not only involves heat and pressure, it also requires elongation of the substrate to be formed. The status quo in ink-jet ink development emphasises difunctional, high-crosslinking acrylates that cannot withstand the heat and pressure needed in the thermoforming process. Nor can these inks stand up to the type of elongation required for most thermoforming applications.

During the heating cycle in the thermoforming process, both the inks and the plastic substrate become malleable. In the business, this is known as thermo-sag, glass transition phase or bubble. Pigments can shift in colour or hue during the heating or forming process. And elongation during forming can cause cracking or mosaic features in the final product that make it unacceptable from a quality perspective.

This is due to the fact that the difunctional acrylates commonly used in UV ink-jet formulations have two highly reactive sites in their molecules for faster, harder curing, which add to an ink's durability and productivity, but limit flexibility. (Figure 2.)

The advantages of UV ink-jet formulations centred around difunctional, high-crosslinking acrylates include fast cure speeds, excellent chemical resistance and surface hardness. But, for thermoforming applications, its disadvantages include limited adhesion ranges, brittleness and a tendency to experience shrinkage and edge-curl.

Examples of thermoforming

EXPLORING MONOFUNCTIONAL ACRYLATES FOR THERMOFORMING APPLICATIONS

By carefully examining the role monofunctional acrylates can play, the industry can develop a potentially important new niche for custom printing of industrial products using inks that can withstand superior elongation under high-heat thermoforming conditions. This technology can be utilised by traditional industrial thermoforming operators, but can also offer new revenue streams and expanded product offerings for printing companies with enhanced print capabilities by bringing imaging and decoration in house.

The result? High elongation 3D graphics with vivid colour and visually compelling design capabilities.

DIGITAL THERMOFORMING INK-JET INKS: THE BACKGROUND

Don Sloan has been developing UV printing inks since the 1970s. In 1993, he established Polymeric Imaging (PI) to create UV ink formulations to replace solvent-based chemistry. And, in 2010, PI developed a patented formulation for deep-draw thermoformable UV ink-jet inks and coatings. PI's patents and intellectual property related to digital thermoforming technology were acquired by EFI in October of 2014.

LESS IS MORE: MONOFUNCTIONAL, LOW-CROSSLINKING ACRYLATES

The original custom ink-jet formulations for digital thermoformable UV ink-jet inks and coatings worked well in PI lab tests but required years of refinement before they could be introduced to real-world production environments. These inks enable deep draw thermoforming without the cracking or mosaic features that occur with conventional difunctional, high-crosslinking UV ink-jet inks. Now, this work has yielded a fully-functional solution to digital thermoforming printing using wide-format UV ink-jet printers such as the EFI VUTEk GS Pro-TF. (Figure 3.)

Using monofunctional, low-crosslinking acrylates has resulted in some major differences as compared to traditional difunctional, high-crosslinking UV ink-jet inks that now deliver a functional solution for digitally printed thermoformed products as demonstrated in the accompanying images. These include:

- Pigments or dispersions are not thermo-chromatic; that is, they do not shift in colour or hue during the heating or forming process.

Continued over

- The inks enable unlimited elongation, with the ability to meet or exceed the elongation characteristics of the plastic substrate. There have been successful applications with more than 24 inches of draw, more than 1000% elongation, with aspect ratios greater than 30:1.
- These inks feature extremely broad adhesion ranges with a vast application range that goes beyond the capabilities of conventional vacuum forming techniques.

Developing the inks was only part of the process required to bring this technology to market. In order to create the types of applications included in the images shown here, distortion software is required for proper alignment of the graphic image to the mould. Distortion printing keeps the colours intact and prevents the loss of colour strength when the substrate is elongated. Distortion software allows the design to take into account the required distortion factor. Thermo 3D Suite from Quadraxis (distributed by R&R Graphix in the USA), is an example of this type of software.

And, clearly, exceptional colour management techniques are required to ensure colour accuracy in the final product. In most cases, with proper colour profiling of the printer, colour hue adjustments are not required in the design process. Images are printed at a higher density, but with the same hue/chromatic value. When done correctly, this results in a final elongated product that complies with design intent.

However, successful colour placement for thermoforming applications places another burden on the ink: it must exhibit free film characteristics; in other words, the cured ink film could almost stand alone as its own layer, like a sheet of cellophane. Free film properties, combined with high density, provide consistent colour during the forming process.

Distortion printing keeps the colours intact and prevents their loss of strength when the substrate is elongated

Deep draw thermoforming can be accomplished without cracking or mosaic features

KEY ATTRIBUTES OF MONOFUNCTIONAL, LOW-CROSSLINKING INK-JET INKS

In the lab and in the field, these new inks have proven to have several key attributes that revolutionise the thermoforming manufacturing process using UV ink-jet printing. These include:

- The ability to form parts or signage decoration with fewer steps and in a significantly shorter time.
- The elimination of screen-printing set-up costs or the hand painting and vinyl lettering process used in conventional thermoforming.
- Superior elongation characteristics that support deep draw thermoforming while maintaining opacity on various plastics, including PETG, acrylic, polycarbonate, polystyrene and PVC.
- Inks that withstand heat forming and cutting without cracking, chipping or loss of adhesion.
- Water and moisture resistance that enables durable, lasting images.

LED CURING: A NEW FRONTIER

As with most technologies, there is still opportunity to continue to improve the monofunctional low-crosslinking UV ink-jet inks for even better thermoforming performance. One project currently underway is the development of LED cool cure ink formulations with LED-based photo-initiators using wavelengths of 365 to 400 nanometers, compared to conventional UV inks which use wavelengths of 320 to 365 nanometers. This leverages EFI's LED ink-jet expertise into the arena of thermoformable high elongation ink technology and enhancement coatings.

Conventional UV curing uses UV lights with an elevated temperature, which limits the ability to use lighter weight and heat-sensitive or dimensionally unstable substrates. LED curing takes place at 81 degrees F and results in increased material stability, lower distortion factors and reduced material degradation. As an added benefit, LED lamps feature extended lamp life and lower energy costs.

With LED curing, deep draw characteristics on a thin film could create new opportunities in vacuum forming by leveraging superior flexibility and colour consistency in thin film packaging applications such as direct decorating for blister packs.

Softer cure and high heat tolerances facilitate functional and industrial applications

PROCESS SIMPLIFICATION

In addition, elongation during thermoforming, whether LED or conventionally cured, can translate into stretching profits and shrinking production costs. With a move toward packaging simplification, both for cost reduction and environmental sustainability reasons, thermoformed packaging has the potential to eliminate the need for cardboard inserts on packaging, and reduce cost and time in the packaging assembly process. Direct printing on the thermoformed packaging can also eliminate the need for labels. This offers the additional opportunity to use variable data on 3D plastic packaging for inclusion of bar codes, serialisation and even personalisation.

THE FUTURE IS BRIGHT

The technology advances that have been achieved in the development of monofunctional low-crosslinking UV ink-jet inks for thermoforming opens up a bright new future for thermoformed applications across a number of industries as demonstrated by the examples cited here. As this technology is adopted on a broader scale, it will result in:

- Faster time to market.
- Higher quality, more relevant thermoformed products.
- Reduction in the amount of packaging materials used.
- And more …

The only limit is our imagination. This is just the beginning. ■

Don Sloan is Ink Development Manager and Mike Plier is Ink Business Development Manager at EFI

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NEW REVENUE OPPORTUNITIES

Stacy Hoge outlines some of the benefits of working with LED curing technology

LED curing technology opens the door to new revenue opportunities with more press uptime, higher yields, and the ability to print on heat-sensitive substrates, offering increased profitability for printers. Solutions offer higher print quality, faster curing speeds, and a more reliable curing process. New profit streams become available with the LED technology benefits, in addition to saving energy and eliminating replacement part costs.

The return on investment can be quite fast due to the operating savings and benefits. Users have reported saving more than $20,000 per month after adopting LED curing technology, offering significant return on investment in a short period.

USER EXPERIENCES

LED curing technology offers many benefits that will increase users' printing capability and generate more revenue. Here are some contributing factors from users:

MORE UPTIME:

LED curing units have been proven to support trouble-free press operation. There is no warm-up time due to the instant on/off nature of LEDs. There are no moving parts, shutters to clean or bulbs to replace, leading to higher press usage and operator efficiency. LED also offers higher yields due to consistent energy output.

FASTER THROUGHPUT:

Printers with LED technology perform at 20 to 30% faster speeds on average, assuming other portions of the work-flow can operate at the higher speeds.

LESS HEAT:

With no IR (infra-red) heat, printers can utilise heat-sensitive materials offering new capability.

GREATER STABILITY:

Because of the uniformity and long-term consistency of LED lights, designers can develop safer, more stable, and more reliable processes for printing. LEDs last more than 20,000 hours of operation, with only a minimal drop-off in power over the life of the curing unit.

MORE COMPACT DESIGNS:

Floor space is valuable in all types of businesses. LED light sources can be used to build more compact printers that minimise waste.

QUALITY CURING:

Users report that LED light sources produce higher quality cures and better adhesion on a wide range of materials, including recycled materials.

ENERGY CONSUMPTION:

Users can save up to 50% or more on energy bills. Energy cost savings can be substantial, particularly if power costs continue to rise.

SAFER WORKPLACE:

LEDs contribute to workplace safety because they don't generate dangerous UV-C radiation, excessive heat, or noise. In addition, the 395nm wavelength UV-A light is not harmful to the eyes.

Besides being mercury-free, LED light sources generate no ozone. The rising tide of government regulations is causing all types and sizes of manufacturing firms to be more pro-active in adopting safer, less toxic equipment and processes. This is where LED curing can really be a plus. Companies that have already installed more environmentally sustainable printing processes report that it has helped them attract younger workers and more customers that prefer eco-friendly processes.

RELIABILITY AND LIFETIME

Although LED curing technology has been around since 2002, there have been significant technological advances in LED efficiency and curing performance. The initial challenges have been met and overcome, allowing rapid technology adoption across a broad array of industries. Thankfully, LED light sources have now been architectured to have exceptionally long lives, improved thermal management to avoid overheating, and high quality UV output for a longer period of time. Similar to the lighting industry, LED curing technology has been proven to be extremely reliable and customers can reap the benefits of the technology.

Even though LED technology is reliable, it is important to keep in mind that LED light sources are not created equally. Suppliers of LED light sources have significant architectural and implementation decisions that significantly impact their products' performance. The end result will be a LED curing system with optimised LEDs, arrays, optics, and cooling for a specific application. Knowing how to characterise the performance allows users to identify the best overall system to meet their specific needs.

If maintained properly, LEDs have a long lifetime. Traditional mercury lamps may last up to 3,000 hours but properly managed LEDs will

LED curing technology

Direct printing to containers is an ideal application for UV LED

last more than 50,000 hours. With impressive efficiency and longevity LED technology is poised to be an energy efficient technology.

In 2015, Phoseon Technology announced the lifetime testing of their lamps has now surpassed 50,000 hours of operational on-time with irradiance being greater than 80% of its original output when the test first began five-plus years ago. For perspective, utilising a single shift workweek of 2,000 hours/year, 50,000 hours equates to 25 years of UV LED operating on-time.

LED CURING APPLICATIONS

The UV curing process has been in use in the printing industry for more than thirty years. LED curing technology for UV printers is rapidly replacing older technology with compelling advantages of better economics, system capabilities, and environmental benefits. LED curing technology is ideal for the UV curing of inks in digital inkjet, screen, flexographic and other printing processes.

CONTAINER DECORATION

UV LED technology is used for both digital and screen-printing on cylindrical containers. Curing screen-printed inks on plastic and glass containers is an ideal application for UV LED because of the small print area and need for a compact curing unit that can easily fit into the printing machine.

POSTERS AND SIGNAGE

The sign-making industry has led the change for improved turnaround times, higher quality and more economical solutions for printers that serve this segment of the market. UV LED curing technology enables output on a wider media mix and an extended range of applications, while at the same time allowing for a low total cost of ownership.

A typical example of a digital printer with LED UV curing

CODING AND MARKING

The compact UV LED curing light sources offer advanced capability and increased production speeds for coding and marking applications. The LEDs are instant on/off, so the UV is only on when ink curing has to occur. This saves energy and increases the life of the unit even further. With virtually no maintenance, low operating cost, and faster throughput, UV LED curing is the ideal choice for high-resolution variable data printing on a wide variety of substrates.

LABELS AND PACKAGING

LED curing systems are ideal for label and narrow web printers, enabling end users to print high quality material at maximum speeds. UV LED curing for label printing shows measurable advantages in higher productivity, lower energy usage, reduced heat load for thinner substrates, smaller footprints and clear environmental benefits.

CONCLUSION

More and more users are choosing LED curing light sources for printing processes because they deliver advanced capabilities, improvements in operating economics, and environmental advantages. Printers that utilise LED curing technology have reported significant return on investment in a short period. Users can expand the range of applications they can offer, run equipment at higher speeds, achieve new levels of print quality, use substantially less energy, reduce scrap, reduce VOC emissions in the work-place, and print on lower cost or more environmentally friendly materials. ■

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THE MICRO- AND MACRO-STRUCTURE OF OFFSET PAPERS SUITABLE FOR INK-JET PRINTING

Katarzyna Piłczynska and Stefan Jakucewicz explain their research methods

In this paper the researches on micro- and macro-structure of offset papers suitable for ink-jet printing were presented. For making pictures of micro-structure a scanning microscope was used. In the photos the surface of papers magnified 250 times was presented. Macro-structure was described by PPS roughness. Thanks to the research it was shown that, for ink-jet printing, papers suitable for offset, especially coated products, can be used. They have the largest gamut volume and the lowest roughness.

INTRODUCTION

Digital printing is more and more popular nowadays. It is connected with shorter run lengths, even in books and packaging branches of the industry.

The aims of research carried out at Warsaw University of Technology are to check the possibility of using offset papers in ink-jet printing and to assign them paper classification.

Offset papers are cheaper than the ones suitable for digital printing – this is the reason why owners of digital machines buy them more often than in the past. However using them can be risky because of the quality of prints. Researching the possibility of using offset papers in digital technique is practical and makes sense.

The thesis statement is that offset papers which have special composition and parameters can be used in ink-jet printing. However the criterion of choosing them is the widest gamut volume of prints made on them in comparison to gamut volume of prints made on suitable papers.

Papers suitable for ink-jet and the ones usually applied in the offset printing technique (see table 1) were printed using two types of ink-jet machine – with pigment aqueous-based inks and UV-curable inks. Before the production, these two machines were calibrated – transformation related to the linearisation and the ink limit was carried out (with colour management disabled).

No	Type	Grammage [gsm]
1	Suitable (coated white)	170
2	Uncoated white	60 i 450
3	Coated white	90 i 250
4	Uncoated bulky cream	70 i 350
5	Coated bulky white	90 i 250

Table 1: types of paper used in research

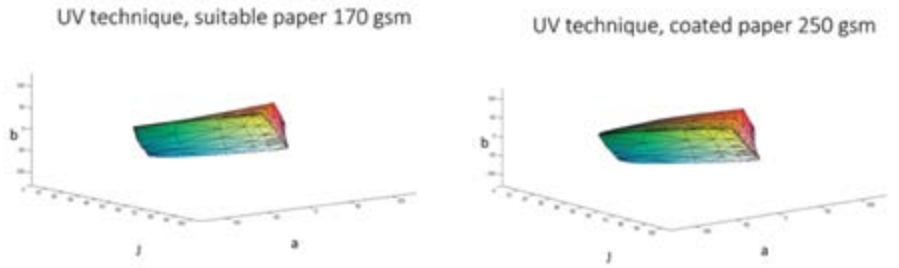

Figure 1: 3D gamut visualisation in CIECAM colorimetric space (ink-jet prints – UV technique)[22]

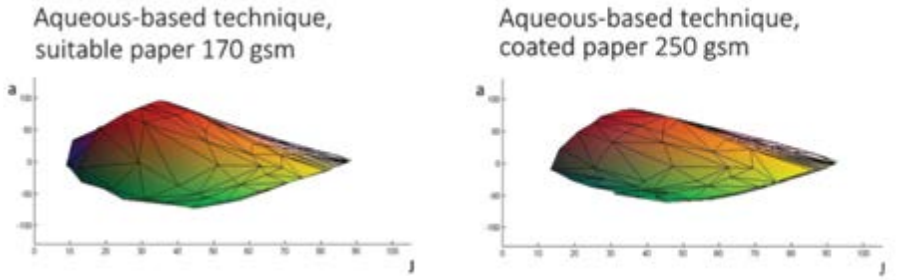

Figure 2: 3D gamut visualisation in CIECAM colorimetric space – projection on plane (ink-jet prints – aqueous-based technique)[22]

A special test was printed on the papers – ANSI IT8/7.3 colour chart with 928 control patches. The spectral reflectance of all patches was measured using SpectroScan (Gretag Macbeth) and colorimetric properties illuminant D50 and standard colour observer, angle 2º.

EXPERIMENTAL – COLOUR GAMUT VOLUMES

There are many publications and conferences materials connected with the gamut topic [1]÷[21]. However, they describe only printing on papers suitable for digital printing. There was no publication related to gamut

Figure 3: JEOL SEM bought by Tele & Radio Research Institute [24]

volume of prints made by using digital technique but on papers suitable for offset. The aim of this article and of the previous one [22] is to present the newest results in this topic.

Although papers suitable for the digital ink-jet technique have one of the widest gamut volume, there are papers, usually used in offset printing machines, which display similar characteristics. It is most visible for prints made in UV machines. It proves that ink-jet printers can use not only 'digital papers' but also coated papers in their maximum grammages and this is the most important conclusion. In the case of aqueous-based ink machines, good results have achieved only two types of coated papers in 250 gsm. Uncoated papers in their minimum grammage have the narrowest gamut volume.

The uncoated papers are quite unsuitable for high-quality inkjet. What is more likely to be their unique employment is the formproof. (layout-proof, ozalid process, etc). 3D visualisation of example cases are presented in figures 1 and 2. [22]

No	Paper/board	Grammage [gsm]	PPS (µm)	
			upside	downside
1	Uncoated white paper	60	4,06	4,11
2	Uncoated white board	450	4,48	4,52
3	Uncoated cream bulky paper	70	4,62	4,81
4	Uncoated cream bulky board	350	5,13	5,21
5	Coated white paper	90	1,9	1,93
6	Coated white paper	250	2,47	2,62
7	Coated white bulky paper	90	3,24	3,64
8	Coated white bulky paper	250	3,06	3,23

Table 2: PPS roughness

EXPERIMENTAL – MICROSTRUCTURE OF PAPERS

The researches connected with microstructure of offset papers were done by using Schottky Field Emission Scanning Electron Microscope (SEM) made by JEOL (see figure 3). Its main features are:

- SEI resolution: 1.0nm (15kV), 1.5nm (1kV
- Magnification: 25 to 1 000 000 (on the image size 120mm 90mm)
- Accelerating voltage: 0.1kV to 30kV
- Retractable Backscattered Electron Detector (RBEI)
- Low Angle BE Detector (LABE)
- Wavelength Dispersive X-ray Spectrometer (WDS)
- Energy Dispersive X-ray Spectrometer (EDS)
- Electron Backscatter Diffraction (EBSD) System
- Scanning Transmission Electron (STEM) Detector

Continued over

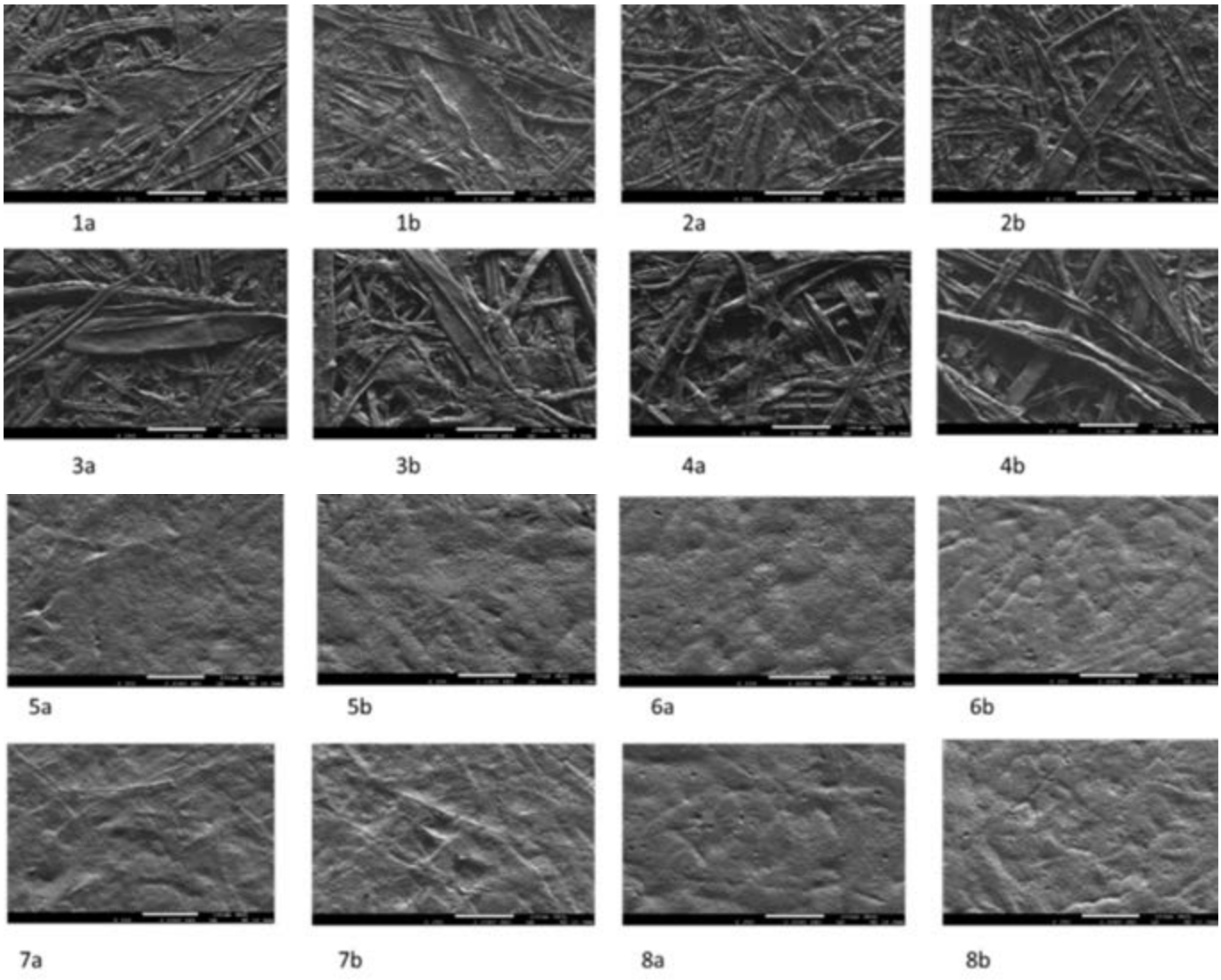

Figure 4: Pictures of paper Surface taken by SEM

- Cathodoluminescence Detector (CLD)
- Liquid Nitrogen Trap (LNT)[23]

Paper is non-conductive material – this is the reason why there was spread carbon on it which made a thin conductive layer (15 to 30 nm thick). Accelerating voltage was 2kV.

In order to observe, Retractable Backscattered Electron Detector (RBEI) was used. There are surface unevennesses and topography presented in pictures. These unevennesses formed a source of contrast for backscattered electrons. If paper was ideally smooth, it wouldn't be possible to do the researches using SEM.

Because of two-sidedness of paper, its two sides have pictures. Two-sidedness is associated with the production process (fine particles and fibres are jetted unequally on the down and upside). It isn't so noticeable currently, but it still has an impact on parameter differences of papers' sides.[25]

In the pictures (see figure 4), there is paper surface magnified 250 times presented. a – upside, b – downside

1. Uncoated white paper 60 gsm
2. Uncoated white board 450 gsm
3. Uncoated cream bulky paper 70 gsm
4. Uncoated cream bulky board 350 gsm
5. Coated white paper 90 gsm
6. Coated white paper 250 gsm
7. Coated white bulky paper 90 gsm
8. Coated white bulky paper 250 gsm

EXPERIMENTAL – MACROSTRUCTURE OF PAPERS (PPS ROUGHNESS)

Macrostructure of papers was investigated via PPS (Parker Paper Surf) roughness. This is a pneumatic method in which air flow is calculated by comparing the pressure drop across the measuring head and the paper test surface with that across the flow restrictor.[3] During the described experiment, the difference in pressure was 1MPa. The results are presented in table 2.

CONCLUSIONS

The biggest unevennesses (macro-unevennesses in macrostructure) characterise uncoated papers, especially the bulky ones. It can be noticed in photos (figure 4, samples from 1 to 4) and in the table with roughness results. In such situations the tone value of ink can't be equal, especially when an aqueous-based technique is used. This thesis is proved by gamut volume results. Prints made on uncoated papers, especially on the ones in small grammage, had the lowest gamut volume. Even visible unevennesses of uncoated boards have no impact on printing results when using UV-curable inks. Such prints have very wide gamut volumes.

In the case of coated papers (figure 4, samples from 5 to 8), unevennesses are much smaller and they are called micro-unevennesses (microstructure). The least rough paper is the coated and white one, in a small grammage (sample 5), which is visible in the photo and also in the table with the roughness results. It can be noticed that there is a difference between microstructure of the up- and down-side. This dependence characterises not only coated papers but also uncoated ones.

As was mentioned before, coated samples had the widest gamut volumes. In case of prints made in machines with UV inks, wide color gamut volumes were achieved, independently of grammage values. However prints made in machines with aqueous based inks, only in coated and not bulky versions, were characterised by the best values. It is connected with the way of ink curing (absorption and evaporation). Microstructure type and smoothness of paper are much more important than in the UV technique.

In order to make parameterisation of papers which can be used in ink-jet, despite the fact they are not suitable for digital printing (they are not produced for this technique), further research is planned. Thereby the users of devices with aqueous based and UV-curable inks will be able to choose appropriate papers for printing made by different producers and think only about their parameters, instead of applications imposed by digital machines manufacturers. ■

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THE NEW AGE OF MASS CUSTOMISATION

Sébastien Hanssens identifies the role of ink-jet as the primary technology making personalisation possible

Consumers are now going out, buying products and then adding their personal touch via customisation – trends have changed since the golden age of advertising and mass-consumed products. The fact is that more products are available to us through more channels than there were in the sixties, seventies, eighties or nineties. With the arrival of the Internet, consumers now also check prices and compare their options before almost every purchase. It seems that the instinctive decision is now only applicable to buying gum and candies at the supermarket just before you pay. Along with this shift in consumption, printing technologies have adapted and industrial ink-jet possibilities are creating new markets for customisation.

The interesting thing about industrial printing is the debate about what it really is, or what it really means. Some will define it as the integration of the digital printing process and its related devices within the production chain – for example, the production of snowboards or skis, where the design is an important part of the end product and its commercial success.

But what happens when a snowboard company doesn't only print 100 units of a specific version but enables customers to have a completely personal and unique design element, such as their name, avatar or photo on the snowboard? Is printing still part of the production line, or is it a stand-alone service that has added value?

SHORT-RUN PRODUCTION BENEFITS

The great thing about ink-jet technology is that it has enabled new applications, allowing shorter production runs which accommodate printed smartphone cases and other personalised objects. And why are brands and companies looking for short-run production? The answer is simply because modern consumers have a broader range of interests than before, behave differently and don't want me-too products any more. Consumers are now going out, buying stuff and then adding their personal touch to it through customisation; ink-jet is the primary technology making that possible.

Designers are now also actively part of the production and commercialisation processes. If you take the example of smartphone cases you have three major scenarios. The first is a company like Marvel (or its licensing company) producing hundreds of thousands of Spiderman covers to sell around the world. The second is a designer with a trendy, NYC hipster style of illustration that finds a printer of smartphone cases and sells its own produced/printed products to customers online. The third would be consumers sending their photos or creations to a web-to-print enterprise for a completely personalised product.

Ink-jet technology has enabled new applications that enable personalised printed objects

The two latter examples are new markets that have emerged or, even, simply exist because of ink-jet customisation. The first case is definitely an example of industrial printing; the second is, in my opinion, also industrial because the printing 'makes' the product what it is.

A $7.56BILLION MARKET

If you doubt that the customisation of smartphones is a market, let's crunch a few numbers. In the United States, 64% of the population owns a smartphone, which makes 204 million owners. The smartphone accessories market is estimated to be $21billion (€18.78billion), with cases representing an estimated 36% – or a market

size of $7.5 billion (€6.76billion). Knowing that on average people change cases every nine to 18 months because of breakage or boredom, you can clearly understand why we see new ink-jet machines or printing production processes developed specifically for that market at all the printing trade shows we attend.

Another good example is the emerging customised decoration market. IKEA is a decoration powerhouse and its products are in almost every household in Europe or North America. Yet, even though we all go and buy furniture or decor there because we like the Scandinavian design and their prices, we are always annoyed to see the same things we have at home elsewhere.

Think of how many times you have been invited for dinner or coffee at a friend's or colleague's house and have discovered they have an identical piece of furniture. Sometimes it is so flagrant that you feel like you were invited to your own home. That's when you start to get bored with the same items you see everywhere. Individuals want to be different and unique. This desire has lead to some very interesting new business opportunities such as 'IKEA-hacking' – the practice of customising your flat-pack furniture with designer stickers that fit perfectly. This way, being the individualistic consumer that you are, you know you won't find that exact model somewhere else.

DIFFERENTIATION FOR THE NATION

Furthermore, consumers are decorating their homes with their own personal touch by ordering customised canvases and other short-run artistic creations. Before the days of inkjet, we used to go to furniture stores or art galleries to buy screen prints or paintings to decorate our walls. Consumers now have access to designers of all different styles to better fit their hipster, classic or avant-garde tastes.

Computer design has been of significant importance in this by enabling designers to create digitally and then configure their products, printing on multiple, high-class substrates such as luxury canvas or glossy Dibond. This is, again, an example of mass production shifting towards short customized runs.

FURTHER CUSTOMISATION TRENDS

If you don't believe this customisation trend is completely evident, simply look at the automobile industry – take the new Citroën DS3 and its multitude of configurations. Buyers can chose the colours of their body, dashboard, roof-top and the design, as well as the interior. The manufacturer's advertisement is straightforward: "Have you ever wondered why no two Citroën DS3s seem to look alike? Today, we're going to look at how customisable each DS3 actually is. Can you truly personalise this award-winning car to match your individual style? Express yourself with the Citroen DS3." The next step will certainly be using ink-jet technologies to monogram your car, with your name or avatar printed on it for you by the dealer or at the production plant.

Mass customisation is a new frontier in business where the volume production of individually customised goods provides a new strategic, promotional and economical value. In a paper by Chase, Jacobs and Aquilano it was defined as the method of "effectively postponing the task of differentiating a product for a specific customer until the latest possible point in the supply network". It is clearly the use of computer-aided manufacturing systems, such as RIPs like Caldera, and the evolution of ink-jet technologies which have permitted us to produce the custom output that we consider to be industrial printing and caters to our desire to be different. ■

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THE EVOLUTION OF WIDE-FORMAT DIGITAL PRINT

Sophie Matthews-Paul assesses the importance of the role played by today's ink-jet technologies

Not so many years ago the wide-format printing market was still in an experimental stage and couldn't be considered a serious contender for production in commercial environments. Since those early days the advances in technology have been rapid, now reaching the point where digital has become the preferred format for many display applications. Reliability in machine build has accompanied the continuing evolution of print-heads and inks, resulting in platforms that produce consistent results that are fit-for-purpose; nowadays, it is rare to find a print business involved in large format jobs that doesn't have an ink-jet capability as part of its plant list of equipment.

Although there has been significant expansion of digital printing systems among display producers, screen-printing companies, sign-makers and, increasingly, the offset litho sector, this hasn't seen the total demise of analogue production methodologies. Where wide-format has scored, complemented by advances made in associative software and the materials available, is by bringing versatility and flexibility to all industry segments where the digital revolution has opened doors to low volumes, one-offs, versioning and variable data. To these criteria can be added environmental benefits through a process that uses no traditional chemistry, plus a reduction in waste and the advantages of just-in-time and on-demand ordering by brands and end customers.

PRACTICAL BENEFITS FROM DIGITAL PRODUCTION

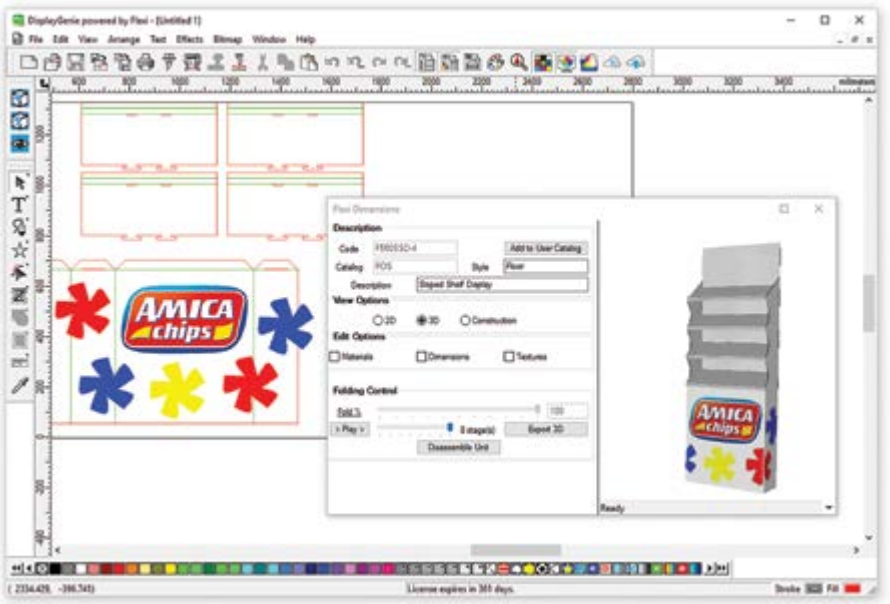
From a practical perspective, wide-format ink-jet production carries the advantage of faster turnaround times, better operating environments, easier logistics, and more efficient end-to-end workflows. Additionally, economic and stock reduction considerations have been factored into this mix and these have helped to bring ink-jet processes to the fore.

During the past two decades, therefore, there has been a significant change into the way that applications coming under the remit of large or wide-format are produced. This took digital print engines, typically ranging in size from 1.0m to 5m, from being speciality machines into the mainstream market. In that period of time, manufacturers have witnessed a metamorphosis in customer requirements, with today's considerations in a print device becoming more diverse and, even, eclectic in many environments.

Thermoforming with LED UV ink capabilities adds new opportunities to wide-format print companies

NICHE AND SPECIALITY MARKETS

While the growth in wide-format print continues, it is noticeable that users of machines are not only servicing the more



Showing need for diversity in wide-format work-flow, SAi's DisplayGenie assists in the creation of displays, boxes and cartons

conventional market requirements but are also moving to new niche and speciality areas where digital technology can realise jobs that, formerly, were not feasible. The ability to experiment with ink-jet and different materials is simplified because of fast-set-up and changeover, the ease of the pre-press process and the viability of producing one-offs or very low volumes.

Additionally, print service providers face challenges not only from competition generated by their counterparts trading in the same market sector but also by new investors in digital technology. Those recent entrants that have opted to take on a niche or specialist segment, rather than merely become a 'me too' operation, avoid the inevitable race to win orders in an arena where rivalry can too often be based on price.

Nonetheless, the growth in demand for wide-format ink-jet production devices continues across the entire digital spectrum with reasons driven by the desire for higher quality, faster throughput and the need for reliability.

SPEED VERSUS VERSATILITY

Is speed of the essence throughout today's wide-format printer users? The answer to this million dollar question differs depending on business model and type of demand. Versatility is still key to the throughput benefits of ink-jet and diversification can often prove to be the key factor that drives better margins and greater profitability. Ergo, effective workflow is as important as the throughput rates of a particular print device, and investment must be quantified against expected daily volumes, diversity and variability of work.

"We know many of our customers are using our printers to produce a wide variety of products on a range of substrates to meet the needs of their customers and to maximise ROI," acknowledges Richard Barrow, senior product manager, LFP signage at Epson Europe. "So one printer can be used to produce everything from retail POS graphics, pop up banners and self-adhesive decals and labels to wall coverings, external displays and vehicle wraps."

Mike Horsten, General Manager Marketing EMEA at Mimaki, concurs: "I believe that diversity in the offering is the key to success. For the most part, a single production type of print company no longer exists. Offering a diverse series of printing products is making the one-stop-shop a reality."

Flexibility is not only governed by the creativity of the display producer or the sign shop. It is encouraged by technologies that have been developed to minimise down-time during job changeover and the ability to produce applications that are right first time. Every minute wasted when a machine sits idle eats into a company's overall profitability, and present day device improvements certainly acknowledge these principles when it comes to functionality and performance.

END-TO-END WORKFLOW ADVANTAGES

Advances don't lie only in the print engine's design and construction; of increasing importance is the benefit of an efficient end-to-end workflow plus integration with onward services that aid accountability, such as streamlined finishing in print-to-cut environments, MIS/ERP and JDF compliance.

EFI's VP Inkjet Solutions at EFI, Ken Hanulec, confirms: "It is fairly obvious to calculate how a company can increase its throughput and its profits by printing more work on a wider, faster printer. But it is too easy for companies to overlook the ways they can also get better results with a better workflow. So it is definitely a way to gain a competitive edge that needs to be recognised."

However, Horsten is more circumspect: "if you are a large print house with multiple printers than the workflow is crucial to survival. Without a good MIS system or an automated workflow the amount of work would kill any company in the long run. But if you are small and know your entire customer base then the demands for perfect workflow are not as important."

Continued over

Agfa's Jeti Mira is designed for users wanting high-speed flat-bed capabilities

With wide-format print devices across all levels providing key output for an ever growing range of end applications, efficiency continues to increase in relevance. "Our support of workflow is the driving force behind efficiency of our printers," insists Barrow. "We work closely with our software partners to ensure that the workflow to printer interface is very efficient."

GETTING IT RIGHT FIRST TIME

Agfa's Paul Adriaenson endorses the relevance of good workflow in today's print operations: "Good throughput means that the machine outputs correctly the first time and every time, job after job. Workflow automates input file and data processing, colour management, printer and finishing settings in order to avoid delays during the entire production process."

Today's users of wide-format printers can come from any background, whether they happen to be designers, former specialists in typesetting or repro, sign-makers, screen-printers or the sign-making sectors of the industry. The common feature among all is that every order should meet the quality of output required, produced to an acceptable price, on time. But every print service provider should look at the bottom line and not just production costs. Horsten emphasises: "There are still companies that don't calculate the entire workflow cost before adding margin. If they can look at the whole cost structure of their business they would know the profitability for the work carried out."

Growth in the wide-format segment is down to many criteria, based on machine technologies and reliability, running costs, diversification in application type and balancing volume against the versatility of low numbers and one-offs. But device flexibility is proving to be a key factor in future investment where fewer print engines can generate the right volumes across a broad range of materials and applications types. EFI's Hanulec sums up: "Diversity is one of the reasons customers like using our hybrid roll/flatbed printers. Many of our customers need to be able to print as many different types of jobs as possible, from corrugated displays printed to traditional banners to everything in-between."

Since drupa 2012 ink-jet developments have continued apace, with the announcement at this year's event of new inks and faster machines that include automation for material handling, streamline print-to-cut options and the advancement of LED curing. New chemistries feature water-based UV-curable formulations, the challenge presented by latex chemistries and the ever present capabilities of aqueous-based, solvent-based and UV-curable options that continue to be used in everyday environments.

HP's Latex 1500 printer was launched at drupa 2016, bringing greater choice to users of 3.2m devices

The aqueous-based SC-P20000 from Epson is designed for high quality photographic output

SUMMARY

Challenges presented by opposing and parallel technologies won't affect the wide-format segment for the foreseeable future. Indeed, increasingly it continues to grow in appeal as it crosses all budgets, speed necessities, the handling of different widths and the introduction of automation. Additional benefits, including greater environmental awareness and greener practices through lower energy consumption, also play a part in shaping the future of ink-jet, as does the increase in workflow and complementary software integration for a true end-to-end environment.

Where wide-format print will find its stronger markets that generate great profitability for its users is in applications away from the main-stream work. Indoor and outdoor displays, banners, point-of-purchase, retail advertising, vehicle graphics and scaffold wraps continue to bring revenues to the supply chain that is established in this market segment but, often, at ever tighter margins. Growth areas, such as printed interior décor, are now generating a new interest in the capabilities of digital print with profitability often being driven by overall project management and creativity — areas where print becomes part of the modus operandi and not an isolated operation.

Compared with events that cater only for specific areas of the print industry, drupa 2016 extended its reach into all segments so that all areas of the graphic arts and beyond are presented with a strong snap-shot of opportunities and the realisation of trends. Connectivity between latter day cloud-based technologies, digital out of home (DOOH) functional applications and traditional production segments showed wide-format technologies playing a cogent role in parallel as a complementary counterpart to alternative processes as well as playing its part in a stand-alone environment.

The increase in demand for customisation and versioning, plus better quality, faster throughput, less down-time and easier accountability has now given a solid ground for wide-format digital print in many print environments, including those that are predominantly analogue. The future won't see an end to traditional processes but it will herald greater diversification across areas where digital print can play a strong practical and economic role across the variable business models that apply to today's industry players. ■

This paper was originally commissioned by drupa for its Expert Article series

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COMBINED SOLUTIONS FOR THE PROCESSING OF NON-METALS

Thorsten Brandt describes the benefits of high-end laser cutting

A modern laser system for cutting and engraving opens up completely new possibilities in the processing of a wide range of materials. So, for example, not only textiles, plastics, wood and composite materials, but also stone and paper can be processed. For more than 20 years, laser-system manufacturer eurolaser GmbH, based in Germany, has specialised in the design and construction of processing machines using CO_2 laser beam sources for areas of up to 3,210 x 3,200mm, discovering new areas of application every single day.

It is possible to use up to two mechanical tools, such as router or different knives, parallel to the laser

LASER BEAMS AS A PROCESSING TOOL

The CO_2 laser beam, a laser which emits a beam in the infra-red range, is focused onto the material to be processed from above, and hits the surface at a point measuring 2/100mm^2 with a power output of between 100 and 600 watts. Thanks to this high concentration of energy, most materials simply sublime within fractions of a second. Adding a process gas, usually simply pressurised air at 2 to 3 bar, accelerates the cutting process and ensures clean cutting edges. There are no fringes, shavings, flakes or threads left behind on the processed part. In general, further processing of the laser-cut part can be undertaken immediately with no re-working or finishing necessary.

Furthermore, as a tool a laser beam is not subject to wear and tear, which is reflected in the relatively low down-time for the machine, and thus facilitates cost-effective production. The material itself is not subjected to any forces as it does not need to be clamped or otherwise fixed during processing. Cutting and engraving are also carried out without any forces being exerted.

WIDE RANGE OF TOOLS FOR INDIVIDUAL WORKING PROCESSES

The modular design of the laser systems from eurolaser, which are made in Germany, now makes it possible for the operator to utilise up to two mechanical tools parallel to the laser. Customers can unconditionally avail themselves of the entire high quality tool range produced by Zünd Systemtechnik AG of Switzerland. In addition to milling tools, countless knives and scoring, marking and stamping tools are available. This provides the ideal opportunity to combine the advantages of most different processing methods according to the customer's requirements, all on just one machine.

A major benefit is the significant space saving in production halls, as well as a saving in high investment costs. And another aspect should not be overlooked – the machine operator does not have to deal with different processing systems and their software. Everything works through the same user interface. Customer requests from a wide variety of markets can be fulfilled easily and flexibly, thanks to the modularity of the eurolaser systems.

The XL-3200 from Eurolaser for cutting and engraving

LASER CUTTING, LABELLING, PRINTING IN A SINGLE PASS

eurolaser is expanding its product range with the addition of two new modules. Operators now have the opportunity to place adhesive labels on laser-cut parts and then print the labels individually afterwards. It is also possible to print directly on the material used. The new options are an optimal addition enabling labelling of the cut parts for additional process steps during production, thereby optimising traceability.

The new label module is a labelling system. It can be installed on laser systems as an option, and equipped with printed or plain

Continued over

SAATI

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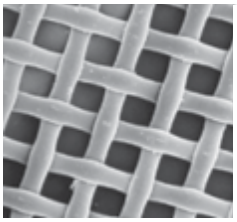
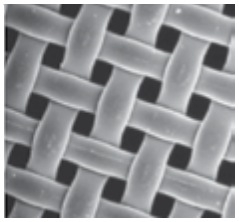

SAATI Hi-Dro Mesh


Standard Mesh


2 Passes of White Ink on Black Tee with SAATI HI-DRO Mesh 198.40


2 Passes of White Ink on Black Tee with Standard 196.55 Mesh

SAATI'S HIGH PERCENTAGE OPEN AREA MESH IS SPECIFICALLY DESIGNED FOR HIGH RESOLUTION TEXTILE SCREEN PRINTING.

SAATI HI-DRO is a high modulus, low elongation, monofilament polyester screen printing fabric with a proprietary surface treatment. This new range was constructed maintaining comparable mesh counts and using thinner thread diameters. It was developed to meet the increasing technical demands of garment and apparel decorators and is specifically designed to optimize both the ink deposit and detail.

KEY BENEFITS

- Better ink coverage with reduced ink consumption
- Achieve better details & halftone performance
- Faster print speeds and reduced squeegee pressure
- Less tendency for water-based inks to dry in screen
- Plasma treated to improve stencil adhesion & durability

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The work pieces are processed without contact and pressure using the bundled laser beam

labels, as required. Different adhesive properties and label sizes provide a broad range of applications for this module. Parts can now be labelled for further processing.

The ink printer module is a print-head that is installed directly next to the laser head. It enables precise printing with a resolution of up to 600dpi. In addition to label printing, it is also possible to print directly on various materials, even on non-absorbent surfaces. This option allows the high-contrast application of sewing markings, serial numbers or other data.

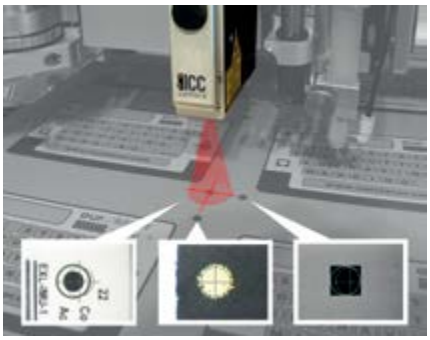
PRINT AND CUT

For some years now, laser systems have successfully been fitted with automatic camera recognition systems. These enable printed fiducial marks, edges or other high-contrast contours to be scanned optically. This means that the position of the workpiece can be identified precisely and taken into account in the further processing. Intelligent evaluation of the position markers also makes it possible to compensate for the dimensions as desired or required by the operator. This is useful in optimisation or in adjusting for the required dimensional tolerance. This addition makes absolute sense, and not just for quality assurance.

One of the big challenges faced by the print and cut market is workflow. It is essential that new finishing machines can be integrated seamlessly into the existing workflow. This means that the software used must include open and automated interfaces to all standard design, illustration, CAD and RIP programmes. With eurolaser's LaserScout software solution, operators can integrate the existing workflow from their i-Cut or Zünd Cut Center seamlessly and continue automated working.

LaserScout includes automatic print and cut data import for the following RIP software manufacturers: Caldera, ColorGATE, EFI, ErgoSoft, GMG ProductionSuite, Onyx, Wasatch, Prepare-it, ZCC and i-Cut. This enables users to continue working in a familiar manner with no need for acclimatisation. The usual processes, including the pre-print stage, remain the same. This saves the operator time and avoids costly mistakes.

With the new label and ink printer module, users can place individual labels onto cut pieces for subsequent printing



The automatic camera recognition system simplifies precision contour cutting

PROCESS AUTOMATION IN PRODUCTION

In order to choose the right system automation, the laser system manufacturer always takes account of the operator's requirements. During a personalised consultation not only does the range of materials to be processed need to be considered, but the whole processing environment must be taken into account. For example, with our tried and tested conveyor system for transporting materials to and from the workstation, eurolaser offers a good solution for the continuous processing of flexible materials. Our shuttle table system, which was developed in-house, is perfect for the processing of thinner materials, such as foils, acrylic or wooden sheets. The material carriers can be exchanged within a matter of seconds so that the laser process can continue without any down time. The materials which have already been processed can be removed in an ergonomically economical way, using the material carrier which has been replaced and the table restocked simultaneously. This enables you to achieve increases in efficiency of up to 75%.

At drupa 2016, eurolaser presented its large-format, multi-functional XL-3200 cutting system with a processing surface of approximately 2,200 x 3,200mm. The company demonstrated the processing of a range of materials using its three-in-one tool concept. ■

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UNDERSTANDING MANAGEMENT INFORMATION SOFTWARE

Nicola Bisset explains the benefits of automated task management

MIS (Management Information System software) has been in the print and graphic arts industry since the early 1980s; indeed Optimus has been successfully trading globally since 1982 and can claim to be one of the first MIS companies in the UK. Yet from an Optimus perspective, we see that our industry is a very long way off from full user adoption and fewer than 50% of companies we speak to have an MIS.

For those companies who have really had maximum benefit from their MIS/ERP systems they can, hand on heart, say that they attribute the upturn they experienced with increased profitability and performance, along with greater visibility and automation at their fingertips, certainly in part to their MIS. You will find many companies speaking in almost evangelical terms. To back that up, here are some statistics from one Optimus customer from 2013 after going live with Optimus dash MIS.

- 50% productivity increases in quotes raised
- Administration errors reducing by 45%
- Savings of £6,000.00 per year through paperless working
- Job fulfilment time reducing by 55%
- Business turnover increased by an average of 46% per year since implementation

IMPROVING EFFICIENCY

Yet, despite this and a wealth of data worldwide to support that good, appropriate and relevant use of MIS/ERP software really can make a massive difference to the bottom line and improve efficiency, here is what we commonly hear:

- "What we do is so specialised, no ERP/MIS can manage it"
- "We have tried standard MIS/ERP software before and it hasn't worked"
- "We have had to write our own system and we need to use Excel to support the process"
- "It is just not flexible enough and doesn't cater for our needs"
- 'The specialist nature of what we do means we always have to constantly change and adapt and software cannot keep pace"

Optimus dash workflow

Does this sound familiar? Well, with all these headlines in mind, and in order to meet these industry demands and challenges, Optimus launched a brand new, highly configurable, process driven, award winning Optimus dash MIS in 2010. This was derived from the very best lean manufacturing principles but introduced into a software environment.

Optimus sought to provide an MIS/ERP system not only for all types of standard and specialist printed items, but non-printed items as well – meaning the type of manufacturing equipment doesn't matter – it's a process that can be defined, and essentially defined by the user if required.

MANAGING PARTICULAR TASKS

Essentially, having provided MIS software variations on a consistent theme since 1982, Optimus wrote standard logical interfaces to manage particular tasks. If a user happened to embrace fully the particular way in which we had written that interface, then users would love our software and may well choose to invest.

Back in the real world and, certainly in 2016, Optimus has found that if you have other demands that mean you feel the need to change the front end GUI (Graphical User Interface) for the precise creation of the estimate and full production job, then you will need a different approach that allows you to determine your own processes and speed up what you do. Essentially this gives the user the means to determine maximum information, by minimal clicks and present only relevant screens and questions to answer. Optimus dash Enquiry & Quote Manager allows users to do just that.

The dash GUI means that users can easily create rapid quotations regardless of complexity, through its highly configurable question driven front end. Thus, dash provides the ability to create quotes in seconds irrespective of print process or substrate. Quotes are then easily converted into fully specified production jobs with all materials required, estimated costs and final invoice values automatically created, without the need to duplicate or re-key information.

What has been outlined at its very core, is essentially lean manufacturing but critically introduced within the MIS/ERP software environment. It has heralded massive changes for the types of projects and specialist work that Optimus can now handle. So let's look at that lean definition further in a traditional manufacturing sense.

THE MEANING OF LEAN

Lean means the systematic removal of waste. Typically, in the print industry, as with many manufacturing businesses, employees are trained to work in teams and apply a series of tools and techniques. However in lean, the focus is on identifying value-adding and non value-adding process steps (including office and administrative processes).

A value-adding step is defined as anything which the customer is willing to pay for in the transformation of material into the end product required by the customer. The team then streamlines the processes selected for improvement, takes out waste and this activity usually reduces cycle time. The result is faster, slicker processes which enhance customer satisfaction and a reduction in cost.

The benefits of lean will vary from company to company but, essentially, if the principles are applied consistently and systematically lean increases profitability, sustainability and customer satisfaction. It reduces human effort, capital investment, materials, time in all aspects of the business and floor space.

As mentioned previously, tools are often required on the factory floor to measure performance and in a software sense there is no difference; it is absolutely mission critical to get the right set of tools to measure. In lean, if you don't measure, how do you know where to improve and what you want more of? But within lean, the focus is always on getting rid of what you want less of – for example, eliminating wasteful steps that don't add value and the customer certainly won't pay extra for. So, what does this mean in practical terms?

VISIBILITY AND EVIDENCE

Developed in conjunction with Vision in Print (VIP) from extensive work done in the last ten years, Optimus is able to provide an incisive tool called 2020 Vision which gives visibility and empirical evidence on what has truly happened as day to day activities have taken place. It means that essentially there is a repeated cycle: plan what you do – do it – check it – act on that information provided and as a consequence this breadth of information can be available to analyse.

These include overall equipment efficiency, combination of availability x performance x quality, people productivity, number of good products made in the number of hours available, not right first time – encompassing job bags, returns, credits and reprints, plus stock turn and how effective is your stock management? Additionally, there is value added produced per person, floor space utilisation, jobs produced on time and in full, estimate conversion rate, customer spend, the most profitable customer or product and best sales representative.

In addition, Optimus dash MIS holds a wealth of data to ensure that all aspects of a print business can be analysed, measured and reported on.

So, if you are seeking more accurate information on the profile of your business, you are thinking that in order to grow you need more premises, more staff and fear that profitability will be squeezed and you are looking for alternative ways to grow. Find out how Optimus can help you lead your business with powerful, accurate, up to date and automated information with an Optimus dash MIS, with lean principles and flexibility at its very core. ■

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THE PAST, PRESENT AND FUTURE OF TEXTILE PRINTING

Ruth Zach reflects on the evolution of inks and dyes

Textiles and clothing have always been a part of the human culture. The Garden of Eden was the first instance in which man asked to be covered and, since then, the clothing industry has come a long way. "Clothes make the man" claims the famous saying; but how do we make the clothes? The present day range of fabrics is immense, from natural fabrics such as cotton, wool or silk to man-made fabrics based on polyester, polyamide and other human processed fabrics. The diversity of the fabrics as well as the design was always intrigued by new looks ruled by different outfits and extravagant costumes which gave rise to the elaborate fashion industry available today. The fast pace fashion industry takes advantage not only of the great fabric variety but also the textile printing possibilities. These possibilities were not always readily available as they are today.

Evidence of textile printing was found in China and among the Incas in Peru already in the first Century. In Europe printed patterns on textiles were introduced much later due to the difficulty in achieving durable printing, which does not fade or wash off. It was not until the development of a durable dying stuff that enabled the first printing of patterns on textiles to emerge.

THE 'OLD WAY' OF PRINTING

The initial method used was rather primitive and done by hand. The method of wood blocking in which the pattern is engraved on a wooden block was the first attempt to print patterns on cloth and it is still employed today in some places in India and in Asia.

The first successful attempt to mechanically print on a fabric was achieved by an engraved cylinder machine which used copper rollers to print on the fabric. The mechanised system, although it had its disadvantages, cheapened the printing process by relying less on expensive labour. Unfortunately, the company building these machines failed but the process was a major breakthrough in textile printing enabling six-colour printing and set the ground for the methods that followed.

The next attempt to improve the printing on textile was done during the mid-19th century by stencil printing in which a stencil was made according to the pattern which needed to be printed. This stencil was usually of a thin metal material with recesses in the stencil in the shape of the printed pattern. The recesses enabled the ink or paste to be pushed onto the fabric and achieve the design. The first stencils were produced flat and later were mounted on a cylinder roller which revolved continuously on the fabric.

Evidence of textile printing was found in China and among the Incas in Peru already in the first Century

PREFACE TO POPULAR PRINTING

All these methods were actually the preface to the most popular printing method most common for textile printing and used until today, this being rotary screen-printing. The method evolved from the cylinder press which was replaced by rotating drums that are much faster and enabled printing of up to 16 colours on a fabric. Although this is an efficient and cost effective method, it does have major drawbacks, especially in the current fashion marketplace. Preparing the pattern takes time and costs money, and this has to be taken into account in the pricing of the final product. Furthermore, setting up the printer results in high downtime of the machine. Adding it up, screen-printing is the ultimate solution for high volume production but not for short runs.

The fashion industry is becoming more and more demanding for creative and unique opportunities. In order to persevere and meet consumer demands, the need for more diversity led to shorter printing runs. The same process occurred previously in the signage and graphic arts and trickled through also into textile and fashion. Only a decade ago, fashion brands, fashion designers and store owners showcased only two collections per year. The transition in the market in recent years dictated the introduction of new items throughout the season. This shortens the life span of the items and requires the industry to adapt and react faster with more fashion items but in small volumes. Even global retailers offer limited edition items and many fashion brands work in

Rotary screen-printing evolved from the cylinder press which was replaced by rotating drums

three-month cycles. This is true for fashion and apparel but also for home textile retailers who change their collections rapidly and offer a wider selection of designs. All manufacturers agree that diversity comes in place of quantity.

MARKET CHANGES

The rapid change in the market required a solution. This solution, as in the case of signage, lay in the adaptation of digital printing also for the textile printing market. However, digital printing was not focused on textile and did not offer a plausible solution for printing on textile. The emerging of mass customisation in textile urged digital printer manufacturers to seek a solution. A solution that can change the marketplace and keep up with the continuous need for smaller quantities yet higher quality production that can be implemented in smaller production space and minimum setup time.

A few companies started to introduce digital textile printers equipped with the common piezo print-head. These new printers enabled immediate textile sampling but not commercial printing since the speed was a major issue. More recent textile printers have improved the speed significantly. However, the speed is still a great problem in textile since the ink drying process is more complicated on textile compared to paper and other common substrates used in signage. Digital printing manufacturers who introduced textile digital printers realised soon after that the main obstacle for textile digital printing is in the ink.

The inks used in digital textile printing are mostly dye based. These inks exhibit strong affinity to the fibres but are limited in the types of fabrics since each fibre requires a different type of dye. Reactive dyes are suited for cotton fibres while disperse dyes are only suited for polyester fibres and the list gets longer for other types of fibres. The specific affinity of the inks to a certain fibre resulted in a very distinct specialisation process within digital textile printing houses. Once a printing house gains experience with printing on a specific fibre, that house usually adheres to printing with a single type of fabric and achieves a high degree of expertise in the process. However, this specialisation inhibits customers from printing other fabric types in a single place.

One of the main advantages of digital printing houses is the flexibility of printing all the customer needs in a single place. This does not concur with digital textile printing.

PIGMENTED INK DEVELOPMENTS

The limitation of dye based ink led to the development of pigmented ink for digital textile printing. Pigment inks eliminate many of the fibre particularity associated with dye based inks and enable printing on a wider variety of fibres, and especially blended fabrics. These inks also exhibit higher light-fastness, wash and rub resistance. Wider variety, higher durability and a simpler post-treatment process made pigmented ink the main ink used in textile digital printing.

However, unlike dye based ink, pigmented ink does not have the strong affinity to the fabric which dye based inks have, yet still require a pre-treatment and in some cases also a post-treatment. In the lack of affinity to the fibre, the adhesion is obtained by the binder, a co-polymer. The binder is a very crucial component of every pigmented ink and determines many of the ink's characteristics. The binder must be compatible with the ink components such as its dispersants and additives. The binder must also be compatible with the fabric's fibres. It is again, the binder that fixates the pigment to the fabric.

WHAT'S NEXT

Many companies have been trying to overcome the limitations of both dye ink and pigmented ink which prevented digital textile printing from becoming a dominant force within the overall textile printing industry. The solution for the ink quandary seems to have been resolved by Bordeaux Digital PrintInk, an Israeli based ink-jet ink developing company that specialises in ink-jet solutions for digital printing applications. The company offers a pigmented based digital textile ink which is suitable for all fabric types and a simple one step pre-treatment and no chemical post-treatment.

In addition, Bordeaux is offering the ink with full compatibility to most common printheads such as the Kyocera, Ricoh Gen 5, Konica Minolta and the Epson DX series. The ink is pigment based but the company claims that unlike other pigmented inks the ink renders the fabric soft and easily suitable also for clothing and fashion. The new inks exhibit the highest degree of durability of 5/5 in wash and rub resistance. The ink is suitable for a wide range of fabrics including mixed and blended fabrics and for the first time offers a true solution for digital printing on short-run applications.

A new pigmented ink that can print on all fabrics is truly a breakthrough in digital printing. The combined solution for digital printing including a textile printer and a compatible ink that enables printing on a large number of fabrics hastened the digital printing penetration into textile and fashion. The embracing of digital printing on textile is the driving force for the fashion industry and contributes in shaping the textile industry as a whole including fashion but also home décor and interior designing markets which can benefit and offer bountiful opportunities for personalised designs. ■

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TRANSFERRING SCREEN-PRINT PRODUCTION ENVIRONMENTS INTO INK-JET PRINTING PROCESSES

Jochen Christiaens, a member of the ESMA Expert team, describes the limitations and solutions

Jochen Christiaens

Screen-printing production environments exist for years and processes have been optimised over a long period of time. Also the inks have been undertaking optimisation and so became perfectly adapted for their future application. From decorative or functional printing onto papers and cardboards, textiles, plastics, metals and flat and hollow glass or wood, the application range has become widely spread. The main referred application in this article is decoration onto architectural glass with glues, masking liquids and primers.

Ink-jet printing has evolved throughout the years, from the graphical large-format printing market into a true alternative industrial printing solution in all of above mentioned application areas. Newer print-head technologies, inks and substrates made it possible for ink-jet to evolve to a flexible, short run, economic and industrial print solution. However, in order to implement this technology into an existing screen-printing production environment and fulfil all its requirements, a lot of questions need to be answered.

LIMITATIONS: PRINT QUALITY VERSUS FUNCTIONALITY

Three main factors decide about the success of a print solution – substrate, ink, print-head technology. Only when these three are well adapted to each other, a reliable and industrialised print solution can be created.

In screen-printing the selected mesh, the squeegee, the emulsion and the ink will define the print quality. For ink-jet, these factors can be compared with print-head parameters and inks. For example, the emulsion border sharpness will define the way the ink shears off the emulsion and leaves a sharp edge. This will be defined (amongst other parameters) by the waveform in the print-head, defining how and when the tail is 'cut off' from the main ink droplet causing satellites or not.

Inks make incredible things possible, but are a very limiting factor at the same time. For screen-printing inks, there are almost no physical limitations toward viscosity, whereas this is a main criteria for ink-jet ink development. Too high viscosity will cause the ink to behave differently during drop formation at the nozzle and during flight or even on the substrate. Attention: in some industrial applications such as printing glues an extreme fine deposition of thin liquids is not required. In these cases viscosities of the inks cannot be modified without losing the initial properties. These types of liquids cannot be used in common piezo print-heads, but need specific dispensing solutions. From a whole range of print technology suppliers it is best to consult an expert to support in finding the best suited for your application.

SOLUTIONS WITH DIGITAL PRINTING

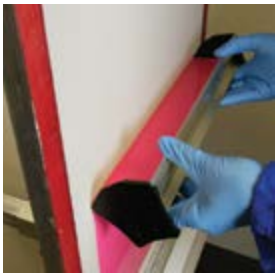
Due to increased demand for shrinking run lengths, production flexibility and quick job turnaround, automated pre-and post-press, variable data printing, or cheaper and shorter run productions (just to name a few basic arguments), many typical screen applications are being switched to ink-jet printing production processes. What are the ways to get it right?

Print technology selection and use of pre-treatment or primers. Not all characteristics of screen inks can be reproduced in ink-jet ink formulation. One major reason for this is the extremely low viscosity of ink-jet inks. Only at such low viscosity levels can they be used in piezo print-heads. The difference in viscosities of several 1000s mPas cannot be compensated easily during ink development. Going through a raw material screening can offer an ink formulation with thinner viscosity, but will most probably not offer the initial performance requirements of the screen printing ink. A much easier approach will be to go through a print technology screening and find out which

Continued over

The result of masking liquids for sputtered mirror glass where each sheet has different images

‘HOW TO GUIDES’ ON-LINE



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Examples of new applications on architectural glass with metallic effects or sputtering using digital printing technology. Hotel Straubs Schoene Aussicht, Klingenberg (source: skara/arbucomp)

technology can be used with the existing ink formulation. Some ink-jet print technologies are specifically developed for use with higher viscous liquids. This way the ink characteristics are not influenced, and the advantages of a digital print solution can be accomplished.

WAVEFORM PARAMETERS

If ink has been formulated but is not jetting perfectly at the very start, an optimisation of waveform parameters can change the print quality. Investigating best suited piezo actuation parameters for each ink requires know-how and the right tools. Setting up a suited waveform will require modifying a whole set of parameters (firing frequencies, head drive voltages, temperature range to alter viscosity, shape of the applied waveform etc).

Ink-jet potential for glass decoration for indoor use in bathrooms, saunas and pool areas. Hotel Excelsior Munich (source: skara/arbucomp)

AVAILABLE PRINTER SYSTEMS OR A DEDICATED PRINTER SOLUTION

For certain applications, such as for example printing onto architectural glass, print sizes recently of up to 3.2 x 15 m (used for the Apple head-quarter building) are required. The maximum screen size however is limited to 3.2 x 8m. Without generating enormous costs for screen making, there is no economical way to execute these tasks other than using ink-jet. Existing printers were used to apply speciality liquids (other than colours) onto the glass and will now expand production capabilities to new businesses and new applications tremendously.

CONCLUSION

Digital printing is continuously taking over parts of production volumes from analogue printing processes, such as screen-printing, flexo and even offset. Thanks to the raised productivity of ink-jet printing solutions, with the ever-growing print quality and the capabilities of automated production work-flows, as well as very quick job turnaround, it is becoming the preferred production process. In the graphics market already a big portion of the printed volume has moved from screen-printing to digital printing. However, there are still a lot of industrial screen-printing applications left to transform to ink-jet. These applications have not been shifted, since they have been extremely challenging toward ink-and printing system development. Many innovative solutions are coming to market for these special applications. ■

Jochen Christiaens, a member of the ESMA Expert team, specialises in ink-jet printing product development

ESMA EXPERT TEAM

ESMA launched the Expert Team at drupa 2016 for all who seek advice on printing for industrial applications, entering new market areas or adopting digital printing strategy. All printing professionals who want to benefit from advice can submit their questions via the ESMA website.

Contributions from other ESMA Experts such as Roland Biemans (LMNS) and Steven Harnie (Printrix) will appear in future issues of *Specialist Printing Worldwide*.

Subscribe now at www.specialistprinting.com to receive future copies.

ESMA
Driving Print Excellence

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TITANIUM DIOXIDE AND ITS ROLE IN WHITE INK

Gabriele Heller discusses the impacts of classification as carcinogenic on the print sector

Titanium dioxide is the white pigment used in manufacturing white ink shades, but also high opaque coloured shades. Due to the high opacity and the high degree of whiteness, there is no alternative white pigment available with similar technical properties.

According to the REACH registration dossiers provided by the manufacturers titanium dioxide doesn't need to be classified as hazardous according to the criteria of the CLP regulation. Currently there is also no harmonised classification for this substance contained in Annex VI of CLP regulation.

In November 2015, however, the French Anses - Agence nationale de sécurité sanitaire, de l'alimentation, de l'environnement et du travail – provided the European Chemicals Agency (ECHA) with a proposal for a harmonised classification of titanium dioxide as an inhalative carcinogen (Carc. 1B – H350i). ECHA's public consultation on the French proposal took place from 1 June until 15 July.

The French proposal is based on a so-called 'lung overload study' in rats. It is a known fact that exposing rats to high amounts of any kind of dusty materials results in the building of tumours in the lung of the testing animals. Humans, however, don't react this way when exposed to inert dust. Titanium dioxide has been used for many years and in high amounts in industrial applications and, during all that time, there has been no known evidence of lung cancer within the workers.

Although the supposed carcinogenic properties of the product are related to dust inhalation, a classification as Carc. Cat, 1B will result in the same classification of all products containing TiO2 in amounts exceeding 0.1%. This is also the case for liquid and paste products like printing inks, despite the fact that from such products no dust inhalation of the TiO2 contained can occur. This problem results from the hazard-based classification requirements of CLP regulation not taking into account whether there is indeed a risk.

CONSEQUENCES:

* Printing on 'sensitive' products like toys or food contact material will no longer be possible with inks containing titanium dioxide, as the use of carcinogenic substances in manufacturing such products is not allowed.
* CMR substances are considered to be substances of very high concern (SVHC). SVHC may be included in the Candidate List for REACH Annex XIV, and finally in Annex XIV itself. Customers often don't want to have candidate list substances ending up in their products and thus require the printers and the ink manufacturers to confirm that no candidate list substance is contained in the ink used. For such 'critical' customers white and high opaque prints will no longer be possible.
* Should the substance finally be included in Annex XIV, further use of the substance, or of products containing the substance, require authorisation, which is a complicated and expensive procedure. It can be assumed that in this case use of the substance in inks will no longer be possible at all.
* For products classified as carcinogens, restrictions on EU and on national level with regard to handling and storage apply. Probably not all print shops will be able to comply with such requirements. Thus they can either no longer use white and high opaque inks, or they will have to invest in technical equipment to achieve compliance of their print shop with legal requirements related to handling and storage of carcinogenic products.

In September, the ECHA's Committee for Risk Assessment (RAC) will next meet and foreseeably then will come to a decision whether or not the French proposal is accepted. Should titanium dioxide indeed be incorporated in Annex VI to the CLP regulation as a 1B carcinogen, in the future we may see other substances be classified the same way, just due to their physical state – with similar consequences as outlined above. ■

Gabriele Heller is Chairman of ESMA's Health, Safety and Environmental Protection Committee and Senior Manager Product Safety at Marabu

ESMA
Driving Print Excellence

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DIGITAL OPENS NEW DOORS TO CREATIVITY

Flexibility, speed and control over processes brings expansion

Thanks to digital direct printing, a design team is expanding its modular service catalogue into fine art printing, packaging design and advertising technology. They place high demands on their own work. The team ties together a variety of disciplines, as well as weaving-in the individuality of each customer.

"The Impala has opened up completely new areas of business for us," Benjamin Bergmann notes. He is managing director of the family business that his parents founded in 1992. At the time, they specialised mainly in trade show and exhibition architecture, communication design and product design. Today, thanks to digital UV-curable direct printing, Assoziation Bergman is also a specialist in fine art printing, creation of packaging prototypes and advertising technology. The company name crowns everything. It puts everyone under obligation to keep joining up new disciplines. Association does, after all, mean "connecting and linking thoughts and ideas" – in Bergmanns case, always enriched with emotion.

THE OFFER OF MODULARITY

What Assoziation Bergmann offers customers is modularity. The modules have names like conception, design, planning and execution of trade show appearances, point-of-sale solutions, shop fitting, corporate design and visual communication, photography, printing, advertising and production technology. True to the motto "recognise individuality, design and communicate", the team puts together a service package that suits the customer and the project. Implementation is interdisciplinary and mostly done in-house. "That makes us flexible and fast. And most of all, we have control over processes," emphasises Bergmann.

The machine makes the company flexible and fast, with control over processes

Matching Assoziation's services in modularity is the way swissQprint wide-format printers fit together. Bergmann has delved into the swissQprint toolbox more than once. At the time of delivery, the Impala was simply configured with seven out of its nine colour channels. Soon there was demand for higher productivity. So they had the six colours – CMYK plus light colours – upgraded to a double head configuration. Then came a second white channel and a varnish channel, both of them with double head configuration. The result was twice the output, as well as yet more possibilities. Later on, swissQprint introduced the nine picolitre droplet as an option for fine art applications. Assoziation seized on this possibility, too.

Packaging prototyping is a new field of business opened up by the Impala

The swissQprint prints direct to a variety of substrates

FULLY EQUIPPED

The Impala UV printer currently stands fully equipped. With the board option, it prints oversized formats up to 2.5 × 4m. For comparison the print bed measures 2.5 × 1.6 metres. The roll-to-roll option allows printing on flexible continuous media and the machine can also do tandem printing. This means that the operator loads substrates onto the rear half while the printer is at work on the front half of the print bed. The instant it has finished printing on the front, it goes to work on the rear. And vice versa, until the print job is done. Then there is another small secret weapon that Assoziation has acquired called the 'lady-gun'. This pistol-like tool eliminates electrostatic charges on acrylic glass and other substrates that are prone to static electricity. Due to ionisation, the microscopically fine ink drops hit their precise mark even on these kinds of difficult media, for a crisp print image.

HIGH SELF-REQUIREMENTS

This print image is precisely where Assoziation Bergmann scores. "Never before have we seen such precision printing on wood panels," attests Jason Martinez, CEO of Eicher workshops, a producer of museum graphics and guidance systems. Using the board option, Assoziation Bergmann printed 3.5m-long wood panels for a large exhibition at a history museum.

Assoziation Bergmann has supplied the design department of a German car manufacturer with custom-printed wallpaper. Applied edge to edge, the transitions were in exact register. Benjamin Bergmann holds a design degree and has high requirements of himself and that means he experiments and develops until he is satisfied with the result. And he attains his objectives faster with the Impala than with earlier means of production. "We save a lot of time and money," he remarks. He also appreciates how Amber, the swissQprint output software, permits so much freedom for experimentation.

OPEN TO ALL SEGMENTS

Design for exhibitions and trade shows remains the core business at Assoziation Bergmann, usually in co-operation with specialist agencies. "Working designer-to-designer is so much fun," explains Bergmann, "We can contribute a lot of know-how." Assoziation Bergmann works with publishing houses like C H Beck, DroemerKnaur, Piper, Hanser, Diogenes and MairDumont, in some cases for the past 20 years. The team has realised twelve booths at the last Frankfurt Book Fair.

A completely different and very complex story concerns orders for traffic signs using LED technology from a well-known company. Absolute precision and highest quality are required here, in printing with the Impala as well as in milling on the in-house Zünd cutter. Further jobs involve short runs, as well as display and packaging prototypes. In the field of fine art, Bergmann supplies photo and art reproductions as well as large-sized artwork. For interior finishing, the company prints table and door panels as well as drywall and glass kitchen elements. It learns from this enormous diversity. "And quite apart from that, it is a real pleasure," says Bergmann.

EMOTIONAL ELEMENTS

Emotions guide philosophy and activity at Assoziation. "Buying the Impala was, ultimately, a gut decision," says Bergmann. Emotion also characterises attitudes to clientele and projects. Bergmann sees personal relationships with customers as a clear competitive advantage in a crowded market. In this context, he is respectful regarding growth. He wants his business to stay as compact and agile as possible. Yet despite everything, he is mulling over the idea of sooner or later acquiring a second, larger swissQprint machine. As usual, Bergmann is letting gut feeling guide him. It already proved spot-on when buying the Impala. ■

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Barbieri opens new office in Salt Lake City

As an important step for Barbieri North America to bring it even closer to its partners and customers, in August the company opened an office in Salt Lake City where its new warehouse and support centre are located.

With additional staff and a new point of contact, customers and partners will be able to contact Barbieri North America during business hours and will be forwarded to the according department. Because of the warehouse in Salt Lake City, which is occupied and staffed every day, orders can be shipped daily. This ensures shortest delivery times and lowest transport costs to customers and partners.

After one year of very successful co-operation with Color Concepts of North America as official North American Service Centre, this co-operation has been intensified in order to continue and improve excellent service towards customers and partners. ■

Intense development results in GEW's full air-cooled LED UV curing system

GEW (EC) has taken the design and manufacture of advanced UV curing systems for the label printing, coating and digital printing industry further with its advances in UV LED technology. The use of UV LEDs for curing in the printing process has become increasingly visible throughout the industry and GEW has now introduced a fully air-cooled LED UV lamp-head.

After an intense development period GEW's new, fully air-cooled LED UV curing system lamp-head LA1 includes special consideration given to the enhanced airflow design to ensure effective heat dissipation at high power levels. The LA1 is built around the same proven cassette-based design as the E2C and LW1 lamp-heads and is fully compatible with existing ArcLED systems without the need for external chillers, pipes or coolant or indeed any other modification.

Within an ArcLED system, printers are able to operate full hybrid UV curing, working with both mercury arc and LED lamp technology on the same press. The operator simply swaps the required cassette and the Rhino ArcLED power supply automatically recognises which type of cassette is installed in the machine. It switches from low voltage DC power for the LEDs to high voltage AC for the arc lamps and changes the display on the Rhino touch screen control accordingly.

The LA1 is an LED UV curing solution that is able to perform without the heavy infrastructure and maintenance required by water-cooled LEDs while enjoying the benefits of the efficiency, reliability and extended life cycles of LEDs. Additionally, the RHINO ArcLED power supply is extremely energy efficient showing considerable energy savings when compared to conventional electronic power supplies. ArcLED gives the option of running a truly flexible hybrid curing system. Several printers have already doubled the productivity of their machines by optimising curing to best suit each process on their presses.

The ArcLED UV curing system is the only truly futureproof technology for upgradeability of arc lamp to LED UV systems. Printing presses that operate with ArcLED technology can now be upgraded from arc lamps to LED to fully exploit the advantages of both technologies with the same power supply, controls and cooling system. This will give the user maximum freedom and flexibility and will avoid getting locked in to one type of curing technology.

GEW Rhino ArcLED curing systems are supplied, as standard, with its embedded service package. This allows remote monitoring of the system running condition, allowing the manufacturer's service engineers to detect and correct out of tolerance parameters. This type of remote preventative maintenance ensures the entire UV system operates at peak performance at all times thus avoiding unplanned machine stoppages. ■

GEW's LA1 (right) is a fully air-cooled LED UV lamp-head

New addition to Ultraflex's back-lit product line

Ultraflex Systems has launched the newest addition to its back-lit product line designated Illumi-Pro UV BL Film. This 100% PVC-free, PET film is designed specifically for high-speed UV printing. The 7.4mil back-lit film has an industry leading enhanced white point allowing for a pure back-lit image.

Illumi-Pro UV BL Film is printable on both sides – one side offers a matte finish while the other offers a gloss finish. The material is ideal for back-lit banners, light box applications and back-lit display systems. Illumi-Pro UV BL Film is printable with UV inks and is available in widths from 1016mm to 2.18m (40 to 86 inches) on production length rolls of 8.33m (328 ft). ■

Illumi-Pro UV BL 100% PVC-free PET film from Ultraflex

RISO's new SF series features high speed, technical improvements

RISO Inc has scheduled the USA release of the company's latest line of digital duplicators, the RISO SF Series. Launched at the start of September, the SF duplicator series offers superior print quality while simultaneously delivering the same speed, reliability and durability that RISO is known for.

First showcased at the RISO Dealer Meeting 2016 in May, the SF Series is packed with improvements that make it faster, sharper, and easier to operate. Among the improvements are a redesigned, customer friendly, colour LCD panel, and an increased speed from 130 to 150 pages/minute. The SF Series now features a true 600 x 600 dpi, an improvement over the previous model which delivered a 300 x 600dpi. Its master-making time has been improved, and it is now 10% faster than previous models.

Another significant change for the SF Series is a new formulation for its ink. RISO has chosen to produce its SF inks out of a more ecologically responsible and under-utilised material – rice bran. While the ingredient itself is environmentally friendly, rice bran ink has proven to have even better archiving capabilities, by eliminating the yellow paper discoloration that can appear over time. The new ink formula and the SF's environmentally friendly features, such as its extremely low energy consumption, provide an effective way to reduce your operation's carbon footprint. ■

Nazdar and VFP Ink Technologies bring digital inks to French market

Nazdar has collaborated with French screen ink manufacturer VFP Ink Technologies to supply a co-branded range of digital ink products to print businesses in France. VFP's products for laminated plastic cards are sold in the USA by Nazdar through an exclusive partnership agreed four years ago. A collaboration between the two companies in France therefore happened naturally, according to VFP Sales Director, Sébastien Petit.

As a subsidiary of Tripette & Renaud Group, established in 1836, VFP's core business is manufacturing decorative and functional screen inks for industrial applications, such as bank cards, adhesive labels and printed electronics. In 2015, it reported turnover of 25m (around £20m) and employed 160 people, covering the whole French market.

"When we learnt that Nazdar was looking for partners to develop its digital inks market share in France, it was for us a good opportunity to bring an added value to our existing offer to our customers," Petit explains. "The partnership was very important for us because the market in France is aware that VFP Ink Technologies does not produce digital inks, yet Nazdar is well known in that industry – we could not start with a better digital inks partner than Nazdar."

Nazdar and VFP Ink Technologies will supply co-branded ink products

The co-branded products are manufactured by Nazdar and sold under the recognised VFP Ink Technologies name in order to reach customers in France as quickly and smoothly as possible.

"Nazdar provides high-quality products at a very competitive price level – they really are the best alternatives to OEM on the market – which of course is beneficial for our customers, who want to save money without the quality of their work being affected," continues Petit. "As many of our customers are equipped with Mimaki and/or Roland printers, we decided to focus on providing Nazdar plug-and-play solutions specifically developed for those printers."

VFP is supplying Nazdar alternatives to EcoMax, EcoMax2, SS2 and SS21 OEM inks in 440ml cartridges, which can be installed as the original containers run out without the need to recalibrate the machines.

"We're delighted to partner with VFP Ink Technologies," comments James MacDonald, Vice President of Marketing at Nazdar. "VFP Ink Technologies has extensive expertise in the screen inks sector and is incredibly well connected across France and beyond, so can offer great support for new and existing customers. In return our experience in developing advanced digital ink formulations will open up the market for VFP Ink Technologies." ■

Fifth Kodak Prosper for Toppan Forms

At drupa in June, Kodak announced the sale of a fifth Kodak Prosper press to Toppan Forms. The deal will see the printing giant become the world's largest Prosper user when the Japanese market's first Prosper 6000C Press has been installed. Toppan Forms will utilise its new press for variable textbook and business mail printing.

"Our existing presses have been running at full production, and the addition of a fifth Prosper Press will enable us to continue our path of steady growth and best serve our customers across multiple markets," says Akira Kameyama, Senior Managing Director and General Manager, Toppan Forms. "This investment testifies our confidence in Kodak Stream ink-jet technology and the overwhelming printing productivity it delivers."

"We are delighted to strengthen our relationship with one of the global print industry's leading print service providers, and will continue working closely with them to ensure they capitalise on all the benefits the Prosper 6000C Press delivers," adds Philip Cullimore, President of Kodak's Enterprise Inkjet Systems Division. ■

IKONICS expands international support staff

IKONICS Corporation, a Duluth-based imaging technology company, recently announced the hiring of Joseph Chau as Asia Sales Director and Jevons Chow as China Marketing and Sales Consultant. Both are tasked with supporting existing customers while developing new markets and customers throughout Asia for IKONICS's core screen-print and photoresist products as well as the company's' new business initiatives.

Joseph Chau has 24 years of sales experience with screen-printing technology including chemistry, emulsions and films. Based in Singapore, he has focused on market and product development throughout Southeast and North Asia. Jevons Chow has 18 years of experience in technical sales and screen-printing technology focusing on PCB and solar cell applications as well as textile and graphic screen-printing.

"We welcome Joseph and Jevons to the IKONICS team," states Robert Banks, Vice-President, International Sales. "Their technical expertise and sales experience will be tremendous assets to Chromaline Screen Print Products and IKONICS Imaging customers throughout Asia. We, IKONICS, remain committed to providing the highest quality products and services across the globe." ■

Sawgrass's new SubliJet-HD Fluorescent (FL) inks

Sawgrass launches new Sublijet-HD Fluorescent inks for the Virtuoso

Product decorators can now add fluorescent colours to graphics with Sawgrass's new SubliJet-HD Fluorescent (FL) inks for the Virtuoso 630mm eight-colour Product Decorating System featuring the VJ 628 printer. This new eight-colour ink set adds fluorescent yellow and pink cartridges to the proven SubliJet-HD C, M, Y, KXF, Lc and Lm configuration, giving sublimators a true multi-purpose solution for a much wider range of applications than possible with traditional CMYK inks.

"This newest ink set for the Virtuoso 630mm 8-Colour Product Decorating System is for all sublimation decorators who wish to add the excitement and visibility of fluorescent colours to their capabilities," says Patrick McGinnis, Sawgrass's Director of Product Marketing. "Finally, those who print college and professional sports products, corporate logos, promotional and safety products, high-visibility signage and other products can add both fluorescent accents and full-fluorescent prints to their design capabilities."

SubliJet-HD FL provides a preconfigured colour palette of 16 fluorescent colours that can be loaded directly into Adobe Photoshop, Illustrator or CorelDRAW graphics software for easy use. New colours can also be created, applied and saved to the palette for quick spot colour matching and frequently printed jobs.

In addition to striking, true fluorescent images, SubliJet-HD FL delivers superior quality output for traditional prints. VJ 628's eight-colour capabilities with Lc and Lm components provide smoother gradients and shading for high-resolution images, when compared to traditional CMYK output. With the addition of SubliJet-HD Black XF to the set, this new configuration also provides extended image stability and longevity.

SubliJet-HD FL currently manages colour using Wasatch Soft RIP. Additional RIP integrations are currently in development. ■

Screen Print Sri Lanka beckons

Aditya Expositions is extending its must-attend B2B show Screen Print India overseas once again. Screen Print Sri Lanka will be held from 1 to 3 December, 2016 at Sri Lanka Exhibition and Convention Centre, Colombo, Sri Lanka with co-located events Sublimation Ideas Expo and Label Show. This three-day international show will cover a wide range of segments such as screen-printing, textile printing, digital printing, label printing and sublimation printing, providing a rare opportunity to explore new horizons in print.

Screen Print India has always been among the world's leading and Asia's finest exhibitions with a sustained track record since 1994. The Sri Lanka foray has been envisaged after considerable research and interface with members of the printing industry in that country. It will be a win-win situation for all those who are part of these five printing industry segments.

Continuing its fine traditions, Screen Print Sri Lanka, with Sublimation Ideas Expo and Label Show, to be held concurrently, will attract visitors from across Sri Lanka as well as delegations from countries across the globe – focused footfalls that are genuinely interested in exploring business opportunities and new technologies.

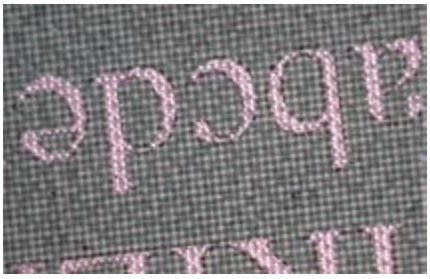
Screen Print India's sustained track record and the fact that it is presented by a reputed event organiser – Aditya Exposition (P) Ltd., ensures much-needed confidence for exhibitors and visitors. Being held bi-annually in Mumbai since its inception two decades ago, this international exhibition on screen, textile and digital printing made its North India debut in 2013, Goa debut in 2014 and even forayed overseas with the brand Screen Print Vietnam in 2015, returning to its home base, Mumbai in May 2016. ■

Lüscher XTend! increases the finest details in technical screen-printing

Designed for screen-printers, Lüscher Technologies has developed its software package XTend! having closely analysed the need to reproduce increasingly finer details in technical screen process applications. Incorporating XTend!, any MultiDX! user can now significantly increase the quality of his screens, particularly when reproducing the finest text and lines.

XTend! automatically detects even the finest lines and smallest letters or patterns and, thus, considerably increases the exposure range of the emulsion. This software, combined with a high resolution optical system up to 10,160dpi, provides repeatable exposure results on screens, hitherto not possible.

Following extensive tests with MultiDX! customers, Lüscher Technologies AG has released the new software package XTend! which is available now. The software can be installed on the existing spooler and the user is able to specify various parameters according to his particular needs. ■



XTend! detects even the finest lines and smallest text

RUCO launches new corporate website

Since July 2016, RUCO printing inks, a leading manufacturer and system provider of highly specialized industrial inks for screen, flexo, pad and gravure printing has been up-and-running with a new and redesigned website. The objective has been to broaden the range of functionalities as well as optimising usability and simplify navigation. This follows the implementation of the company's new corporate design and the site can be viewed at www.ruco-inks.com ■

RUCO's new website optimises usability and simplifies navigation

Ritrama's graphics academy to display all application solutions

Ritrama has opened its Ritrama Graphics Academy, a new application and training centre within the Basiano plant, the company's state-of-the-art production facility for self-adhesive materials. Covering an area of about 300 square m, the Academy has been created for a dual purpose – as a research and development centre dedicated for product and application tests and a visitor centre for customers and distributors to experience first hand Ritrama's self-adhesive filmic applications.

The Ritrama Graphics Academy showroom at the heart of the company is divided into three different areas. The first one houses the R&D department, a laboratory where the company's technical team perform all quality procedures from printing to plotting trials up to lamination. These tests are carried out to ensure conformance in all areas of application which the end user may come across on a daily basis, even unusual exposures.

The technical team also writes all technical literature to accompany any new product launch. A special Application Corner is dedicated to car wrapping and to the RI-WRAP self-adhesive cast range, which is on display showing a range of films in different textures, colours and finishes. As a permanent training centre, this site will be the setting for recording new video tutorials, which serve as an important tool to help in the correct application of the various self-adhesive materials.

The Ritrama Graphics Academy is a new application and training centre within the Basiano plant

The second area hosts a large space where customers have the chance to test the latest Ritrama innovations on different apolar or non-apolar surfaces. Panels have been positioned to reproduce various application substrates, such as glass, and surfaces with rivets, raised and textured finishes for the wall graphics ink-jet print media series. The floors in this area will be customised with Ritrama Floor Talker for floor decorations.

Finally, a large area in the training centre has been allocated for distributors and customers to organise their own events in partnership with Ritrama. This corner will be set up individually for every event.

"The opening of RGA completes this year's investment plans and marks a further important step towards future growth. We decided to build the academy within the Basiano plant with the aim to create a location which focuses on the quality and excellence of the self-adhesive products we sell into the market," explains Ronald Rink, Graphics & Industrial Division Manager. "Customers will choose the Ritrama brand in the knowledge that our products have been both laboratory tested and trialled in a prepared end user environment. In fact we have been able to recreate the entire world of graphics application inside the graphics academy." ■

Caldera pairs up with Luescher-Tschudi for high-speed textile production

Swiss printer manufacturer Lüscher-Tschudi GmbH has formed a strategic partnership with Caldera, where the French print software innovator has developed an OEM version of GrandRIP+ to drive the company's 3.2m textile printer, the T-REX 320. The combination allows those entering this expanding market to achieve high quality results across high-speed runs for soft signage and industrial textile applications.

Lüscher-Tschudi combines its Swiss reputation for quality manufacturing with a innovative but experienced approach to engineering. The T-REX 320 is built for accuracy, featuring a specially engineered fabric loading and transportation system to avoid banding. Incorporating Konica Minolta 1024i print-heads in a four- or 16-head configuration and available with four or eight colours, this new printer, which can hit 120 square m/hour in top quality mode, can be used with water-based, disperse dye or reactive dye inks and includes an in-line fixation unit and dryer named Quickfix Neo.

Caldera's GrandRIP+ allows users to extract the ultimate power and precision from this new challenger in the digital textile printing market. Native features within the company's award-winning software include colour management functions crucial to top-quality image reproduction onto fabrics, as well as media and ink optimisation to help owners avoid consumable waste. For true full industrial production of decorative and functional textiles, T-REX 320 owners can upgrade to the newly launched Caldera TextilePro suite to benefit from RGB workflow and pattern options. ■

Marabu brings new inks to K 2016

Marabu has introduced a variety of inks for screen, digital and pad printing that open up entirely new possibilities for industrial applications. These are based on the principle that plastic is a fascinating material and exceptionally versatile. Highly malleable, it can be moulded and drawn into practically any shape – and it can be printed.

K 2016, taking place in Düsseldorf from 19 to 26 October, is the plastics industry's premier trade show and Marabu will be among the exhibitors (hall 4, booth C63-04). As a leading manufacturer of inks for screen, digital and pad printing, the company will be presenting its updated product portfolio. It will be showcasing UV LED-curable and low-migration inks for screen-printing of plastic packaging, for printing in the automotive industry and for touch user interfaces, as well as solutions for the safe printing on sensitive products.

Highlights will also include new technologies, such as a combination of screen and digital printing. For digital applications, Marabu will be demonstrating the possibilities of liquid coatings and water-based inks for plastics. ■

Marabu's new UV-curable screen-printing inks for personal care packaging

ICC releases Axeon non-pvc, non-phthalate high density white ink

International Coatings Company has released its new Axeon High Density White 1843 Direct Print ink. As part of its Axeon line of non-PVC, non-phthalate screen-printing inks, the Axeon High Density White 1843 is highly suitable for creating dimensional and 3D print effects on fabric.

The Axeon High Density White 1843 creates a heavy deposit and extremely sharp edges, especially when printed through thick stencils. It is easy to create interest and texture on print designs using this ink. Axeon High Density White 1843 cures to a very soft, pliable film.

This ink can be printed with manual as well as automatic presses and yields excellent wash-fastness on a variety of substrates, including cotton and cotton/poly blend fabrics. ■

Axeon High Density White 1843 makes it easy to create interest and texture

Vastex's semi-automatic screen coater brings consistent, repeatable results

Less than one year since its introduction, the Vastex C-1000 Semi-Automatic Screen Coater has been upgraded. It comes as standard with a digital voltmeter that allows the operator to easily dial in a specific coating speed based on the voltage reading for consistent, repeatable results, according to Mark Vasilantone, president.

Also new is a redesigned top screen clamp that can accommodate screens as small as 25cm and up to 90cm in height with virtually no width limitation, for greater design flexibility. The spring-loaded clamp securely holds wood, aluminium and retensionable frames up to 5kg.

The new screen coater is also equipped as standard with a larger and more powerful motor that provides smoother motion and handles heavier screens. It functions by causing the screen to descend at a steady rate using a foot pedal control, allowing a scoop coater to be held more steadily using two hands than possible with one-handed manual methods.

The rate at which the screen travels during the downward coating stroke can be adjusted according to emulsion viscosity, screen mesh and emulsion thickness to output as many as 50 screens/hour, each with three coats of emulsion.

The new digital voltmeter supplied as standard on Vastex C-1000 Semi-Automatic Screen Coater

According to Vasilantone, uniform application of emulsions can overcome blotchy screen exposures and inconsistent ink deposition, allowing screen-printers of every type and size to boost quality, cut rejects and save time at low cost. The wall-mount design saves floor space and is available in 110- or 240-volt models. ■

Expansion plans for STS Inks sees new facilities at Schiphol, Amsterdam

As part of its growth and expansion plan, STS Inks has opened a new branch office, warehouse and distribution headquarters located at Business Park, Schiphol, Amsterdam in The Netherlands. With this new distribution centre, customers from Europe, the Middle East and Africa will be able to order and purchase all products from STS Inks ever growing catalogue of alternative wide-format premium ink replacements.

All STS Inks Europe packages are shipped daily to its different distributors all over the EMEA regions, guaranteeing to satisfy all customer demands with a fast and efficient supply chain. Its cartridges, bags, boxes and bottles are based on the company's plug and play technology, which STS Inks says guarantees all users a perfect result, just as though they were using original inks.

All of the ultra premium inks distributed by STS Inks Europe are made in the USA at its manufacturing headquarters with the emphasis on outstanding quality and performance. The company says it has the ability to supply all the inks companies require, for final users and distributors alike, with no quantity being too small or too big so that products and services are specifically tailored to suit user needs. ■

Adelco supplies Milton Keynes based DTGUK.com with its third Kornit system

Milton Keynes based DTGUK.com has become the first UK company to install the Kornit Digital Storm Hexa direct-to-garment digital printing system which incorporates the NeoPigment process that makes it ideal for use on nearly all fabrics. An existing user of two of Kornit's Breeze machines, this new addition means that throughput rates can now be augmented with the added benefit of working with a wider variety of garments and apparel. All solutions have been supplied by Adelco Screen Process Ltd, long-established in the screen-printing, drying and digital textile printing market segment.

Co-directors of DTGUK.com, Nick Davis and Phil Walker started their original textile printing business seven years ago to concentrate on the direct-to-garment market. After investigating the capabilities of all machines available, they chose to invest in two Kornit Breeze systems. Having selected Kornit Digital's technology and favoured the NeoPigment process, the company worked with UK supplier Adelco who looked after all aspects of the purchase, training, supplies and service.

The growth of DTGUK.com has resulted in the need for an additional high productivity direct-to-garment printer and the addition of the Kornit Digital Storm Hexa now means that Davis and Walker can concentrate on fulfilment printing. This further investment into a direct-to-garment system is ideal for heavy-duty production cycles with a variety of apparel and garment products, including items such hoodies and aprons as well as T-shirts. Again, after researching the market thoroughly, Davis and Walker found it an easy decision to remain with Kornit and their company is the first in the UK to install this new system which was launched at FESPA Digital 2016.

Both Davis and Walker have always enjoyed working with Adelco Screen Process whose knowledge of the textile industry migrated into the digital production segment more than twelve years ago. "Kornit's wet-on-wet and in-line pre-treatment processes are key for production – there are few restrictions to which textiles Kornit can print on," comments Adelco's Luke Smith. "At Adelco we have the advantage of generations of experience in the textile printing market and this enables us to help businesses make the transition and expand their digital production. The fact that Nick and Phil returned to Adelco for their latest investment demonstrates how we work closely with our customers to make sure that they invest in the best solutions for their needs."

Timed for installation to fit in with DTGUK.com's move to new premises, the Storm Hexa is now up and running, producing custom-printed products with no minimum order number. Examples include workwear, jumpers, aprons and speciality apparel as well as more typical T-shirts, hoodies and sweat-shirts – none of which could be accomplished quickly and easily without the assistance of Kornit Digital's print technology and pigmented ink system. ■

The new Storm Hexa at DTGUK.com with (from left) Nick Davis, Phil Walker and Luke Smith

ITALY PROMISES A REVOLUTION FOR INDUSTRIAL PRINTING TECHNOLOGY

Marcus Timson and Frazer Chesterman provide a comprehensive run-down of what to expect at InPrint in Milan, 15–17 November 2016

InPrint's organisers Marcus Timson and Frazer Chesterman (right)

Italy is Europe's second largest manufacturing economy and Milan is a world-renowned design capital. In terms of industrial printing, the country has been an early adopter and a developer of new technology so, as a result, industrial sectors are thriving in a culture of collaboration and creativity. Décor, textile, ceramics, leather, glass, automotive and packaging, plus other industries are all enjoying a renewed emphasis on innovation as the market responds to changing demand and industrial printing continues to grow.

All the research conducted by IT Strategies and InPrint point towards accelerated growth for industrial print technology. It is a coalescence of consumer demand and technical innovation which is driving new opportunities for industrial print and, as such, the innovative Italian marketplace will provide added impetus and new opportunity for this sector. This year's InPrint in Italy promises to be a key event in the development of industrial printing with a particular focus on décor printing.

The InPrint show itself has the vision of connecting new markets, creating new possibilities, and will unlock new opportunities for advanced print technology for manufacturing. Visitors attend from across different industries from automotive to packaging, and from pharmaceutical to sporting goods manufacturers, with the core driver being to source customised printing solutions for industrial applications.

THE INDUSTRIAL DECORATION REVOLUTION IN ITALY

The ceramics industry in Italy has been revolutionised by ink-jet and, in just five years, the ceramics market has shifted from analogue printing to digital – driven by demand for more flexibility and lower cost production. With the market centred primarily in two key regions in Europe, in Spain and Italy, this revolution was quick and comprehensive. This has led many to ask the question: "Which industrial decoration market will next tip to ink-jet?" Attending InPrint 2016 will provide further answers.

InPrint in Italy has many new exhibitors participating. A leader in ceramic print production, Gruppo Tecnoferrari will have a stand for the first time and has significant experience in developing single-pass ink-jet printing for ceramics and new décor applications.

In addition, System Group, another Italian based leader in industrial ink-jet single-pass technology, will make its début as a participant at InPrint 2016. Also a leader in ceramic print technology, this company will be connecting with new markets and opportunities across a range of décor printing at the event.

Italy's Smartcolor is a new exhibitor at InPrint 2016. Its technology is based on the best roll-to-roll plotter re-engineered for industrial printing with systems that allow direct printing without pre-treatments on many materials. These include flat or slightly corrugated (5mm) such as wood, plastic, aluminium, ceramics, glass, cardboard and leather, providing a printing effect without thickness and with no odour, even with white ink. As with many exhibiting companies, the emphasis is on creating new print potential for fresh applications and markets such as crafts, fashion, industry, graphics and design.

A new exhibitor for 2016 is ink-jet leader and InPrint Knowledge Partner, EFI. With its headquarters in Silicon Valley, California, the company is a major supplier of a constantly developing range of high-end production ink-jet printers and inks, print MIS/ERP workflow technologies and globally recognised EFI Fiery digital print workflow technology systems. Its thermoforming technology is making important inroads into functional applications where its UV-curable ink can be used for the creation of formed printed objects.

Specialised operations within EFI include EFI Cretaprint in Spain, producing ink-jet printers claimed to be the most advanced digital ceramic tile decorating systems, and Italian-based EFI Reggiani, manufacturer of printing machines and pre-post treatment equipment principally for the textile sector. Expansion continues as earlier this year EFI acquired Rialco Ltd in the UK, one of Europe's leading suppliers of dye powders and colour products for industrial manufacturing industries.

Fujifilm will again showcase a range of advanced technologies for industrial and package printing applications. Visitors will have the opportunity to take advantage of the company's leading expertise to discover how they can fulfil a wide array of industrial ink-jet applications.

WINNING TECHNOLOGY

InPrint 2016 Great Innovations Winner and innovative ink manufacturer, Kuei will, again, exhibit at InPrint with scanning technology and with its software partner, Metis, showing the impressive impact of their Haptink ink. This collaboration between engineering, chemistry, scanning technology and software enables the production of decorative wood with an impressive 3D haptic effect.

SunJet is another leading ink company participating at InPrint 2016 and one which has also invested in the growing décor segment. Phil Jackman explains how ink-jet is bringing something very new to this type of production which increases efficiency. "Ink-jet is an enabler in direct print as it is a non-contact printing process," he states. "Traditional analogue printing works well onto paper but is more difficult onto hard surfaces. The combination of short run capability and the jettisoning of the supply chain become synergistic when printing direct to boards with ink-jet. My vision is that ink-jet will grow radically in the wood decoration industry."

Canon Italia is another to participate, with a stand based on the possibilities available for industrial printing. Digital printing opens a world of new opportunities, even to companies that don't know the potential or simply have never used it for interior decoration, furnishing, technical components and more, and all are now easily customisable with impressive decorations. Featuring on the stand will be applications presented by FPE I d'Officina, a technical partner which already uses Canon technology to produce interior applications, and more, for companies from many sectors. Visitors are welcome on the Canon stand to touch applications and discuss with FPE I d'Officina the wide range of application possibilities.

DIRECT-TO-SHAPE PACKAGING

Packaging is the largest single sector within industrial print and the continued development for direct-to-shape is building interest from brand and retailers. Italy is a leader in the packaging arena and has a number of exhibiting companies with products focused on this segment.

InPrint exhibitor, Italian company Martinenghi, is located close to Milan. It has successfully launched the Michelangelo direct-to-shape ink-jet printing machine which can print direct to containers. Likewise, German innovator Hinterkopf is another participant with leading direct-to-shape technology that is adding value to high end container production. Recent news from Ritter, one of the company's key customers, is that the Hinterkopf machine is capable of printing onto sealant cartridges whilst matching the quality achieved by screen-printing.

Additionally, energy reductions are considerable when printing with the D240 digital printing machine and Ritter has reported significant savings using 210 fewer metric tons of plastic per year, saving 15 metric tons of special waste, and 2.4 metric tons less waste such as old paints, paint residues and liquors. In terms of power, Ritter has reported savings of 450,000kWh of electrical power per year. In so doing, the company is reducing its CO2 emissions by 270 metric tons, proving the growing importance of industrial ink-jet.

ToneJet is also a leading direct-to-container print technology with a speciality for printing onto aluminium cans, proving popular in particular with the growing craft drinks market. With its nozzle-less print heads for industrial reliability, Tonejet's digital printing technology is now opening up new opportunities for can printers and craft brewers alike, and contributing towards the growth of this exciting world-wide market.

It isn't just the marketing benefits that are driving preference for cans. For one, cans better retain the freshness and quality of a beer. Unlike bottles, they cut out UV light that degrade hops and change the taste and nature of the product.

USA based EPS will also exhibit at InPrint 2016 for the first time. This company evolved into industrial ink-jet largely through its experience in pad-printing which is still being developed and integrated. EPS has grown with the support of Italian company Comec, based near Milan; until 2006, analogue printing was the main focus. However, the demand for digital solutions for product decoration began to shift the following year and, at that point, EPS developed its first single-pass ink-jet machine. Most recently, EPS has been acquired by Xaar, another leader in industrial ink-jet innovation.

INDUSTRIAL SCREEN-PRINTING

Sakurai is one of the world's foremost manufacturers of industrial screen-printing equipment and, at InPrint 2016, the company will be providing insight and innovations for this sector. A leader in automated screen process for manufacturing, it will be demonstrating the power, flexibility and variety of industrial applications achievable with its technology and showing its MS80SD + CCD (camera registration system).

Screen-printing specialist ESC supplies machines for producing industrial items. Utilising a huge technical centre which is designed for testing, this offers customers the possibility of practical print tests. In this way, the suitability of the different print processes can be checked right from the very beginning of a product's design. As well as its print technology, ESC has more than 65 years of experience in industrial printing concentrated on innovative, individually designed print solutions.

Nazdar manufactures the most comprehensive selection of UV, UV-LED, water-based and solvent-based digital ink-jet, screen-printing, and narrow web inks and coatings, all obtainable from a single source. These inks are used within automotive, direct-to-shape packaging, smart technology and many other applications.

Milan based Sirpi will exhibit again at InPrint and has been a manufacturer of screen printing ink and varnish for more than 50 years. The company supplies many industries such as furniture, automotive, packaging, label and general graphics. It has a wide range of inks ready to use, often designing and manufacturing inks specific to customer requirements. Sirpi has expert knowledge and manufactures water-based, solvent-based, UV-curable and UV-LED products.

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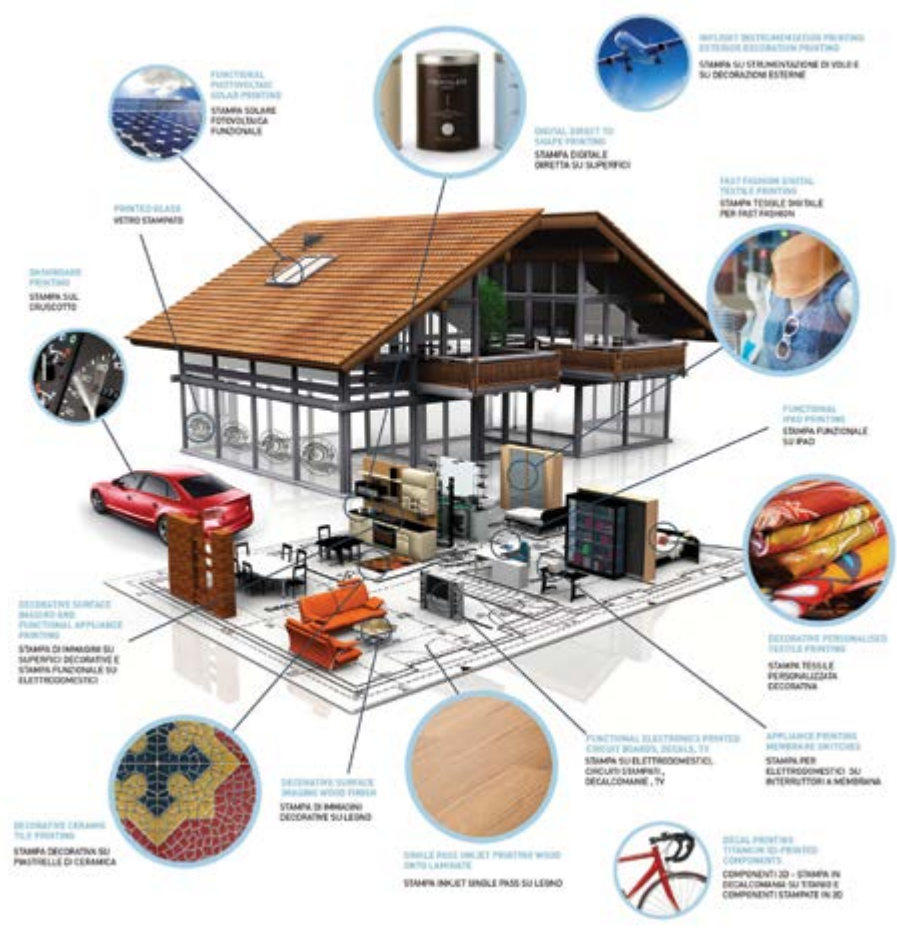

Industrial and functional print both play a growing huge role in today's applications

InPrint 2016 will host a comprehensive series of conferences and talks

FUNCTIONAL INK-JET PRINTING

A new exhibitor is French based Ceradrop which is a division of MGI Group. This company designs and markets materials deposition digital printers exclusively for the printed electronics industry and for smart 3D printing. Utilising a modular-based scalable concept, CeraPrinter series models present new opportunities for feasibility studies and the launch of new products into the printed electronics market.

Alchemie Technology will show its Jetronica technology, which is an industrial head insofar as it has been designed for industrial use. The company says that most heads are fundamentally designed for graphic printing so the emphasis is on high viscosity for precise image reproduction. Jetronica comes at it from an entirely different angle and is designed for digital deposition of a variety of functional fluids.

While there is a significant amount of interest in direct-to-shape ink-jet technology for packaging, the development work undertaken by Mankiewicz with CyconJet is opening up new possibilities for different manufacturing lines. With a background in paint manufacturing, Mankiewicz developed CyconJet which is a UV ink-jet system specifically developed for applications in the industrial sector. The company believes it is a different proposition to print onto paper and foils than it is directly onto curved shapes and metal based products.

Thieme is an international leader in high quality screen-printing and digital printing systems, from classic graphic printing to specialised functional coatings and the integration of printing processes in complex manufacturing procedures. The Thieme-Digital printing system is a variable machine concept which can also be tailored to individual customer requirements whether screen-printing or digital printing.

SPONSORS AND AMBASSADORS

Ricoh is a founder sponsor and Ambassador at InPrint 2016 and has been an innovator in the field of ink-jet technology for more than 30 years. The company is now marketing its fifth generation of ink-jet heads which is being used in 3D modelling, textiles and an array of industrial applications. In addition to this Ricoh will also show its industrial technologies.

Jet-Set is a founder sponsor and Ambassador at InPrint 2016. A leading European developer and integrator of industrial ink-jet solutions in a wide range of industries, in 2015 it launched its innovative Gate technology platform which provides OEMs with the opportunity to quickly adapt technology production for a particular application within a specific industry utilising single-pass, roll-to-roll scanning or conveyor belt technology with industrial ink-jet.

Another founder sponsor and Ambassador at InPrint 2016 is Mimaki with its reputation as a leader in the manufacture of wide-format printing machines. The product portfolio ranges from solvent-based machines to textile printers and, for industrial, a range of advanced UV-curable printers. Mimaki will show its latest applications for membrane switches, packaging prototypes, machine parts and many more.

Agfa Graphics is also a founder sponsor and Ambassador at InPrint 2016 with the strapline 'Your partner to integrate print into manufacturing'. The company demonstrates how ink-jet technology in its industrial manufacturing lines assists the function, decoration or manufacturing of devices. Agfa will show its UV ink-jet ink formulations that can be tuned to specific applications, as well as profound knowledge of the integration of all the elements in an industrial ink-jet printing process.

Heidelberg is yet another founder sponsor and Ambassador at InPrint 2016 and, in Milan, it will launch its revolutionary Omnifire 1000. This technology utilises ink-jet but it prints directly onto a solid 3D object, so the company describes this as 4D printing. Deploying sophisticated software that scans a surface then triggers electronics to jet perfectly onto an uneven 3D surface, this opens up new opportunities for print production onto surfaces and objects.

Another founder sponsor and Ambassador for InPrint 2016 is INX Digital, part of Sakata, and always at the forefront of expanding its involvement in the printing and information industries, as well as taking an active approach to creating new business. Through its global network of companies it is a key player in manufacturing and developing ink solutions for newspapers, packaging, graphic arts and industrial printing onto evolving application areas including direct-to-shape printing.

Sensient Imaging Technologies is also a founder sponsor and Ambassador for InPrint 2016 with its wide range of inks and solutions for industrial digital printing, plus the capability to develop or integrate any of the components of the ink-jet process. Sensient now markets highest performance inks for all applications of digital textile printing, these being reactive, inks for polyamide, sublimation, pigment and direct printing onto polyester. In addition it produces a large range of inks for decorative materials, high pressure laminates, solutions for wall and floor coverings and water-based inks for non-absorbing substrates.

Last but not least, Xaar is a founder sponsor and Ambassador for InPrint 2016 and a world leader in the development of ink-jet technology and manufacture of piezo-electric drop-on-demand industrial ink-jet print-heads. This technology is used within a wide array of digital print applications including direct-to-shape, packaging and outer case coding, labels, wide-format graphics and ceramic tile decoration and other developing industrial applications. Xaar also develops and sells ink systems and electronics and offers a fluid optimisation service to accelerate ink-jet system development and adoption.

Continued over

IMI EUROPE

IMI Europe facilitates learning and collaboration within the community of inkjet technology developers and users for digital printing and deposition applications.

We organise high quality conferences and courses aimed at strategic and commercial executives as well as technical developers in the digital printing industry.

Upcoming events:

28 November – 1 December 2016
Amsterdam | Netherlands

IMI Europe Digital Print **Europe**

Featuring the IMI Europe Digital Printing Conference – the strategic business and technical conference for the digital inkjet printing industry – with market and application overviews and technology updates.

13–14 December 2016
Tokyo | Japan

IMI Europe Digital Print **Japan**

Trends and technology in the textiles, commercial and industrial inkjet printing markets in Japan, including the WTiN Digital Textile Conference and the IT Strategies Executive Conference.

See **www.imieurope.com** for more information and further event announcements.

INPRINT 2016 CONFERENCE PROGRAMME

In Milan this year there will again be a full programme of free educational sessions. The high–quality conference series will run in two areas of the exhibition, these being the Main Conference room and the Showcase Theatre, focusing on trends and key areas of development in decorative, functional and package printing.

More than 60 presentations from top speakers and industry experts are available to all visitors, as well as lively discussions and debates all day every day, ensuring that the event delivers a 'content rich' experience for all.

THE CONTENT STREAMS: Surface Decoration – Tuesday 15 November – Main Conference Room

Following on from the opening ceremony and running from 10.20 to noon TCM Technical Conference Management, organiser of global events for the decorative surfaces industry, will host a 1.5 hour session on the application of digital print on decorative materials such as laminate floorings, wood-based panels and luxury vinyl tiles. Digital print is becoming a more and more established technology for this industry and leading experts will speak on this exciting new outlet.

The key address is from Klaas Kackmann-Schneider of Tarkett who will present a producer's perspective within the TCM Décor Segment of the InPrint Conference Programme. In a special presentation, he will provide insight from the customer's perspective with the development and the integration of ink-jet into large industrial production flooring.

The full programme is as follows:

1 10:20 **Introduction – Surface Decoration Conference**
Hosted by Kurt Fischer, *Technical Conference Management*

2 10:20 **The First Decade of Digital Decor Printing: What Have We Learned?**
Stefan Fiedler, *Salon Iris*

3 10:40 **The Digital Future of Decor Printing**
Stephan Schunck, *SURTECO*

4 11.00 **Digital Printing of Wooden Floors: A Producer's Perspective**
Klaas Kackmann Schneider, *Tarkett*

5 11:20 **Digital Printing in Decor Industry: The Benefits Move from Small to Big Order Sizes!**
Carsten Brinkmeyer, *Hymmen*

6 11:40 **Functional water based pigment inks for industrial applications and the early adoption into single pass technology**
Andy Hancock, *Mexar*

12.00 End of Session

Industrial Digital Textile Conference – Wednesday 16 November PM – Main Conference room

Inkjet Alliance, in partnership with FM Brooks, is organising a conference entitled 'Industrial digital textile printing – beyond apparel and home textile' to explore and investigate the opportunities for digital textile printing beyond apparel and conventional home textiles into more industrial applications. The seminar will focus on pushing new boundaries for digital textile printing in industrial applications.

Topics of discussion will include development of digital textile printing for automotive industry and other industrial and technical areas:

- Deposition of functional fluids on textiles
- Digital finishing of textiles
- Innovating interior decoration concepts using digital
- Digital textile printing – business potential beyond fashion

IMI Europe Inkjet Tech Talks – 12.00 to 13.00 – Main Conference room

IMI Europe will be hosting a series of Tech Talks from industry leaders such as Global Inkjet Systems, Pivotal Resources and Inca Digital. They will cover key technology items including inks, software, print-heads, nozzle maintenance and integration, and are designed to complement the other content available at the show.

Digital Printing in Packaging – Thursday 17 November - Main Conference Room

Paul Jenkins from ThePackHub hosts a lunchtime discussion from 13.00 to 14.00. Titled 'Why Digital Print in Packaging is here to stay', this will review stand-out digital packaging examples and explore why this important medium is being embraced by progressive brand owners and is certainly no flash in the pan.

Showcase Theatre Programme: 15 - 17 November

As well as sessions in the main conference room there will be a packed programme of more informal sessions in the Showcase Theatre. Particular highlights here come from Professor Patrick Smith of University of Sheffield on Wednesday morning with his research into unique applications for ink-jet. David Lyus, Sales Manager – Specialist UV Systems, GEW (EC) Limited will discuss performance and energy saving with air-cooled UV curing technologies, Sebastien Hanssens of Caldera discusses 'How you can integrate 3D printing into your 2D print business', while Sean Smythe of Smithers PIRA shares his findings from research into the key trends in industrial ink-jet. A new segment on Thursday from 13.00 – 14.00, hosted by author and leadership guru, Phil Whiteley, looks at 'The growing pains of industrial print' with evidence on how successful companies have overcome the pains of growth and expansion and how this can be applied to the sector.

Show visitors come from all industries to source information about industrial print

NETWORKING AT INPRINT

Once again, the networking party is sponsored by Diamond Dispersions (Lubrizol) and will take place in the exhibition hall after the show closes on Tuesday 15 November. Visitors and exhibitors are encouraged to stay and enjoy a relaxing evening and networking opportunity, with the party starting in true Italian style with an 'aperitivo' and wonderful canapés.

GREAT INNOVATIONS COMPETITION IN THE SHOWCASE THEATRE

This competition comprises individual four-minute presentations from exhibiting companies with innovative new products shown at InPrint 2016. There is an expert panel that will judge the top two presentations before the audience attending the Great Innovations decide on the final winner. In 2016 Kuei won the Great Innovations Award, with Ricoh receiving the accolade of being highly commended. This is an exciting, entertaining and dynamic competition format and is well received by participants and audience. The event takes place in the Showcase Theatre on Thursday 17 November at 14.00. Contact frazer.chesterman@mackbrooks.com if you would like to enter. ■

All information is correct at time of going to press. Visit the website for latest details.

Further information:
web: www.inprintshow.com

LOOKING AT PERCENTAGES FROM BENCHMARKING REPORTS

Ford Bowers observes shifting trends during the past few years

Ford Bowers

Over the past few months, I've discussed long-term strategy with several people, specifically wondering how trends may change our markets. In doing so, it occurred to me that comparing my thoughts to some past data might be beneficial. Since SGIA conducts annual benchmarking reports in North America, I thought it would be helpful to look back several years to see if some of the assumptions driving current decisions were well-founded. I compared 2013 results to 2016 results and here are some of the things I observed.

DIGITAL EXPANSION

As almost anyone could have guessed, digital expansion in the graphics market continued at a rapid pace. Based on the responses received, 55.8% of the graphics market is now entirely digital in their production technology, up from 36.3% in 2013. Analogue-only shops are less than 1%. However, in the garment community, digital has not shifted the production methodology in the same way. While there was an increase in those who use digital technology in production, up 9% to 67.8%, the 'entirely digital' and 'entirely analogue' shops held essentially steady as a percentage of the market.

MARKETS AND PRODUCTS

One theory relative to the expansion of digital print is that this technology allows imagers to expand the markets served by expanding product categories with fewer barriers to entry and less incremental production costs overall. The same equipment can oftentimes produce many different kinds of products with significantly less investment in capital equipment, and this equipment can be operated by staff with a lot less expertise or training.

The data seems to support this. Of the 13 different customer types tracked in the garment community (eg B2C, government, OEM, financial institutions, retail, etc), as of 2016, all of them reported that 50% of respondents are working with customers who address multiple markets. However, in 2013, only six of the markets had higher than 50% penetration among garment producers. This suggests strongly that the ability to address multiple markets, rather than specialising in only a few, has become a standard strategy over the past four years.

Some of the market gainers here are the 'B2C' market (up to 59.3% from 45.4%), 'government and government contractors' (up

Continued over

to 55.3% from 40.2%), with the largest gain coming from a rapid expansion of 'eCommerce' which rose to 54.9% up from 21.6%. This last set of data correlates closely with the large increase in B2C as well. The ability to make profits from smaller orders as digital has expanded is certainly an underlying factor in opening up this market space. An interesting note here – one of the traditional strongholds for garment decorators has been the 'athletic teams' market, which fell from 72.2% to 52.9% in four years, suggesting that either 'athletic teams' margins were so squeezed that the greener pastures approach offered by digital shifted efforts considerably, or that athletic teams in general were spending less.

For the graphics community, the big gainers included 'B2C' (up from 46.7% to 60.9%), 'OEM and manufacturers' (from 25.9% to 43.5%), and 'exhibit manufacturers' (up from 40.7% to 56.2%). Another gain was in 'athletic teams' where graphics producers increased from 40.7% to 56.2%, which would indicate that rather than teams spending less as a possibility, it really is a margin issue as noted above. For the graphics markets overall, of the 26 categories tracked, 12 ranked under the 50th percentile in 2013, but now only four do, reinforcing the idea that many markets are actively being sought out by a wider range of providers.

ATTRACTING CUSTOMERS

Graphics producers are still counting on referrals as their number one method for attracting new customers, as are garment producers. In fact, for garment producers the top three ranked methods are unchanged with the next two slots going to company website and social media efforts. On the graphics side, it appears that electronic means are now making more inroads and catching up to garment. Efforts to improve company websites rose to the second spot (up from 51.1% to 80.5%) with social media efforts increasing almost threefold from 56.3% of companies putting more focus in this area, up from 22.2%.

Changes in purchasing pattern behaviours are certainly fuelling shifts for the graphics producers, whereas garment producers adapted earlier, quite possibly due to their higher level of B2C engagement. Additionally, when focusing on new strategies in markets where margins are diminishing, website and social media efforts have lower incremental cost factors than other more traditional methods, such as outside or inside sales. That said, in both the garment and graphic communities, efforts across all categories for customer attraction increased over the four-year period. While some were up substantially – such as electronic marketing in all its various forms; all saw increased effort.

PRODUCTION IMPROVEMENTS

Four years ago, the top three methods for improving productive competitiveness for garment companies were:

1 Add new product lines (53.6%)
2 Become a one-stop-shop (43.3%)
3 Staff training (38.1%).

The top three are now:

1 Lean manufacturing/continuous improvement (56.6%)
2 Add new product lines (54.2%)
3 Reduce operating costs (51.8%).

The story is very similar with graphics communities with the top four methods remaining the same (1 Add new products; 2 Lean; 3 Reduce operating costs; 4 One-stop-shop), with one-stop-shop falling to fourth and replaced by lean manufacturing.

While the methods have not changed much, the focus on all of these has increased among respondents in both categories, with more than half of all companies enlisting one or more of the top three choices.

CONFIDENCE

At the end of the day, markets and products are being sought by a wider array of competitors. Is this because times are hard and any sale is a good sale in lean times? Or is it really due to a technological change in print methods, marketing approaches and purchasing patterns, all of which are creating more possibilities? If we look at industry confidence, it would appear it is the latter and not the former.

While many tout diminishing margins as a primary, if not the primary, concern for their business, confidence in the growth of the industry is high with 74.7% of garment and 67.7% of graphic producers feeling confident in the strength of the market. The balance was mostly neutral with a negative outlook held by single digit minorities. With positives in this range, there should be little doubt that technology, with all of its various impacts, has created many opportunities for growth and a sunny outlook as a result.

In the end, while there may be multiple challenges ahead for all, there are also many different avenues to address them. ■

Ford Bowers is President & CEO of Specialty Graphic Imaging Association

SGIA
Specialty Graphic Imaging Association

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web: www.sgia.org

INDEX TO DISPLAY ADVERTISERS

BLUE TEXTILE EMULSION

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BLUE is a ready-to-use, extremely-fast-exposing SBQ-photopolymer direct emulsion formulated for imprinted sportswear printing. It resists plastisol inks—including newer, more aggressive, post phthalate plastisols—and most wash-up solvents, making it exceptionally easy to reclaim in automatic equipment or by hand. **BLUE** is especially efficient with fixed or scanning LED units, as well as with fluorescent tubes or other low-intensity light sources, or in shops that need high stencil making throughput. **BLUE** has high viscosity (6,000 – 8,000 centipoise) that improves control when coating screens by hand. It affords exceptional EOM (emulsion over mesh) build per coat, better mesh bridging, especially on coarse mesh, good edge definition, and fast drying. **BLUE** stencils are durable, will not become tacky under high humidity conditions, have excellent wet strength, and are easy to wash out.

FEATURES AT A GLANCE

- **Ultra fast exposing**
  - -Exposure-efficient with fixed or scanning LED units
  - -Fast stencil throughput for high volume shops
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