ISSUE ONE
2008
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SPECIALIST PRINTING

GLOBAL TECHNOLOGY IN FOCUS

ESMA specialist printing in focus

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MESSAGE FROM BRYAN COLLINGS

Thanks to wonderful industry support, especially from our sponsors ESMA, NASMA and their members, the launch of *Specialist Printing* in 2007 was a big success. We received many favourable comments from readers who like the format and informative content, while advertisers tell us it is definitely being read on a wide basis within their customer groups.

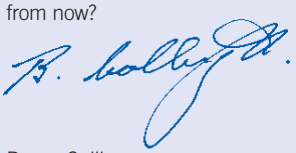
In 2008 we will publish three issues to offer the latest useful technical information and topical items to global users of screen, digital and pad printing technologies. To receive every copy free of charge, please log on to www.specialistprinting.com and put yourself onto our mailing list.

In addition to the technical content in this issue, you will find a gallery of SGIA '07 stands of supporters of this magazine and exhibitors who were members of our sponsors, ESMA and NASMA, at the time of the event.

When I attended the show last October, it was after a gap of five years. The most noticeable difference was the proliferation of companies with a digital offering that now extends into a variety of areas beyond their roots in graphic printing, such as glass, textile, CD etc.

I also noticed that the content of seminars is now much less directed to teaching printers how to achieve good printing results and more to marketing and management issues. Michael Robertson of the SGIA commented that five years ago 80% of companies joining the SGIA quoted "looking for technical help" as the main reason for joining, now they quote "looking for marketing and management help".

Evolution is a wonderful thing. Any guesses as to where we'll be five years from now?



Bryan Collings
Publishing Director, Specialist Printing

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Felcourt Farm Business Park, Felcourt Road,
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PUBLISHING DIRECTOR:
Bryan Collings
+44 (0)1227 272095
bryancollings@specialistprinting.com

EDITOR:
Jess White for Tick Communications
editor@specialistprinting.com

DESIGNER:
Alison Smith for Blue Daze Design Ltd
copy@specialistprinting.com

PUBLISHERS:
Dave Fordham
+44 (0)1342 871224
davefordham@specialistprinting.com

Debbie Drewery
+44 (0)1342 871223
debbiedrewery@specialistprinting.com

Frazer Campbell
+44 (0)1342 871225
frazercampbell@specialistprinting.com

ADMINISTRATION MANAGER:
Sam Dunmore
+44 (0)1342 871224
info@specialistprinting.com

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Q3 (2007) BUSINESS OUTLOOK BAROMETER AND NEW OFFICERS

Parnell Thill, VP Marketing for Ikonics and incoming President of NASMA

Harold Johnston, NASMA's Executive Director

BUSINESS SLOWED A BIT FOR PRODUCT MANUFACTURERS IN THE SPECIALITY PRINTING INDUSTRY DURING THE THIRD QUARTER OF 2007, ACCORDING TO A RECENT STUDY RELEASED BY THE NORTH AMERICAN SPECIALTY PRINTING MANUFACTURERS ASSOCIATION (NASMA). ABOUT HALF OF NASMA MEMBERS SURVEYED FOR THE QUARTER MANUFACTURERS BUSINESS OUTLOOK BAROMETER (MBOB) REPORT INDICATED THAT GROSS SALES WERE DOWN COMPARED TO THE SECOND QUARTER OF 2007, AND NEARLY TWO-THIRDS INDICATED THAT THEIR GROSS MARGINS HAD DIPPED.

The MBOB reports are designed to give members a quick read on the financial health of equipment and supply manufacturers, also providing a rough proxy to the state of the industry as a whole. Among the majority of members who reported a drop in margin, increases in the cost of raw materials was the most commonly cited factor in the change. Encouragingly, most who reported falloffs indicated they were minor, with gross sales down 9% or less and margins down no more than 4%.

In other NASMA news, three new directors and a fresh slate of officers were elected at the association's fall meeting, held last October in Chicago. Parnell Thill of Ikonics Corporation assumed the duties of chairman, succeeding Richard Bowles of Nazdar who will remain on the board of directors as ex-officio. Steve Kahane of International Coatings took over as deputy chairman, while Dave Koebcke of Sefar Americas became secretary/treasurer. Also elected to the board of directors during the meeting were Dave Browske of Avery Dennison, Steve Sheridan of Saati Americas, and Bruce Butler of HP ColorSpan.

NASMA's spring meeting has been scheduled for 7-8 May 2008 at the Westin San Francisco Market Street.

Further information:
NASMA, USA
tel: +1 816 506 1868
web: www.nasmaonline.org

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AN INTERVIEW WITH PEDRO RODRIGUEZ

Specialist Printing speaks with the new ESMA Chairman about the direction the Association will be taking in the coming year

Pedro Rodriguez is the newly-elected Chairman of ESMA

PEDRO RODRIGUEZ IS WELL-KNOWN TO MANY PEOPLE WITHIN THE SPECIALIST PRINTING INDUSTRY IN SPAIN AND ACROSS EUROPE. HE IS CURRENTLY THE BUSINESS DEVELOPMENT MANAGER OF SUN CHEMICAL FOR IBERIA AND HAS BEEN A BOARD MEMBER OF ESMA FOR MANY YEARS. HE IS ALSO THE NEWLY-ELECTED CHAIRMAN OF ESMA.

THE PERSONAL

Pedro Rodriguez was born in Valladolid, Spain and grew up between Valladolid and Santander. After training as an industrial engineer, he started working in the screen printing industry in 1975; "it was my first job and I am still in it," he says.

He has a wife and two children who support him "all the time. I must confess I travel a lot," he says. In his spare time Pedro reads books or walks, although he used to play tennis to a good standard. He enjoys travelling around Europe but loves Spain.

THE PROFESSIONAL

Pedro started working at Prisma, the company that became part of the Sun Chemical group in 1989, and has held a variety of positions such as Product Manager, Screen Inks Division Manager, Business Development Manager Screen Europe and Business Development Manager for Iberia.

Sun Chemical has been active in the inks industry for more than 100 years, manufacturing inks and products for many different industries and applications. In the specialist printing industry it produces inks and varnishes for graphic and industrial screen processes (security, labels, automotive, glass, optical discs, containers, textiles etc.), a wide range of digital inks and products and a full range of pad printing inks.

ESMA INVOLVEMENT

As a long-standing ESMA Board member, Pedro has seen the Association's member numbers increase noticeably during the last few years, from less than 30 to currently more than 60. "ESMA has full recognition as the European association which recruits its members of reference for screen, digital and pad from manufacturers and suppliers," Pedro declares. "It is our goal to continue increasing the number of members in all sectors and business fields in 2008.

To help fulfil this ambition, ESMA has made some changes. "We've just approved a new fee structure, making it more attractive for SMEs to join ESMA," he explains. "We also feel that we need to make some adjustment in the Board structure level, to have a broader representation of our members' business activities."

ESMA has also had a new General Manager recently installed. "Peter is absolutely having the influence we anticipated," Pedro affirms, "and he is fully supported by the Board and the General Assembly."

INDUSTRY INVOLVEMENT

For 2008 members can expect to see ESMA involvement throughout the industry. "The Association is organising table tops, seminars and forums in different areas such as glass and computer-to-screen, but others will also be added in 2008," Pedro explains.

The work of the different committees will also continue. "ESMA is serving the industry and its members through the IA, EPP, TDS, DC and HSPE Committees," Pedro continues. "All of them are involved in different projects that particularly affect our industry."

On an international scale the Association networks with other similar organisations in different parts of the world and will continue to do so throughout the coming year. "ESMA maintains regular contact with other international associations such as the SGIA, FESPA, NASMA, CSPI and SPI amongst many others," Pedro confirms.

THE FUTURE

Pedro foresees a bright year for the specialist printing trade, fuelled by co-operation and industry association involvement. "Specialist printers and suppliers are serving the same industry so anything that can contribute towards working more closely should be positive for all," he states. "Specialist manufacturers and suppliers should adapt their industries by embracing new printing techniques and methods as a way of developing their business, being excellent in what they do and extending their presence in the fast developing countries."

Looking further into the future, Pedro is confident that the right development can allow the industry to continue to thrive. "Specialist manufacturers have a good future if they develop their business in the right way," he says. "Industrial screen applications in particular have a long future. New products and applications will continue developing in the coming years; digital is exploding not only in graphic, where it has a significant presence, but also in textile and other new markets. Pad is a well-established technique for decoration and remains very healthy."

So with a flourishing trade and a promising future predicted, does Pedro foresee more co-operation between different industry representatives? "I feel associations should be different and clearly maintain their identity and particular objectives," he states. "I think we offer a better service to the industry doing it this way. And with the healthy state that our industry is in, I'm convinced that ESMA's future is bright."

LOOKING FORWARD TO 2008!

ESMA STAGED A HIGHLY SUCCESSFUL GENERAL ASSEMBLY IN ROME LAST NOVEMBER, DESPITE THE EFFORTS OF STRIKING ROMAN TAXI DRIVERS AND OTHER PUBLIC TRANSPORTATION TO MAKE IT IMPOSSIBLE TO REACH THE VENUE!

The meeting was attended by the majority of members who found the meeting informative and interesting. There is a growing presence of new digital members, a sign that manufacturers of screen and digital equipment and supplies are looking forward to working together in a market that is increasingly mixing printing techniques.

The association has developed significantly in the past year. With a full-time General Manager, Peter Buttiens, membership has grown to over 50. During 2007, two very successful seminars were held and excellent work has been done by the various Committee workgroups and has been published in *Specialist Printing*.

For the coming year the members have agreed to hold two seminars, fund a major project on an Initiative for Process Optimisation of Screen Printing (IPS) and provide further support for the new General Manager.

The first seminar will be on innovation in CTS equipment and on software developments for pre-press. The seminar will be held in Neuss (Düsseldorf, Germany) on the 4th and 5th November in German and English. The second seminar will be on Membrane Switch technology and will be held also in Neuss on the 6th November. This is an exciting subject in which ESMA members have wide experience, which they are looking forward to sharing with delegates.

Lastly the members voted Pedro Rodriguez of Sun Chemical to be their new Chairman for 2008. Mr Rodriguez thanked the outgoing Chairman, Daniele De Rosa, for all his hard work on behalf of ESMA over the past years.

Peter Buttiens
General Manager, ESMA

ESMA
specialist printing in focus

Further information:
ESMA, Belgium
tel: +32 16 894 353
fax: +32 16 434 971
email: pb@esma.com
web: www.esma.com

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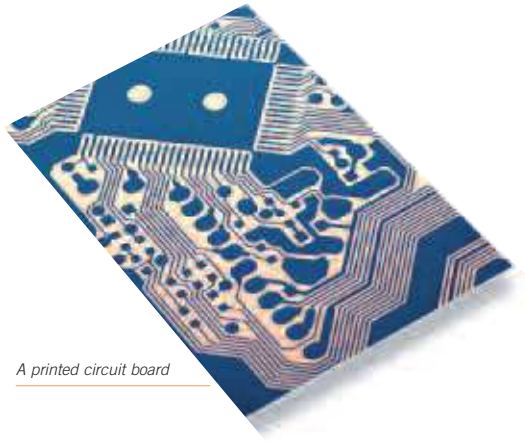
PRECISION MESH FOR TOP-CLASS PRINTING

Bruno Naef details a precision screen printing mesh designed to consistently meet the demand for customised printing



A printed circuit board

TODAY'S BUYERS AND CONSUMERS PLACE EVER-INCREASING DEMANDS ON A PRODUCT'S PERFORMANCE AND QUALITY SO TO BE SUCCESSFUL WITHIN THE MARKETPLACE, SEFAR PROVIDES CUSTOMISED SOLUTIONS AND IS NOT PREPARED TO COMPROMISE.

That is why the individual requirements for high-end screen printing are rising in the manufacturing sector, whether in the automobile and machinery industry, in the solar energy sector, in the production of mobile communication components or in consumer goods such as entertainment equipment or watches. This also explains why industrial screen printers are no longer looking for just a 'mesh supplier'.

CUSTOMISED MESH

These days, buyers prefer to have a partner that can cater for the special needs of their business, in particular the manufacturing parameters of their application. Armed with this information, companies such as Sefar can then produce a customised screen printing mesh that precisely fits the demand.

The screen printing process is used for producing keypads, dashboards, printed circuit boards, membrane keyboards, batteries, sensors, solar cells, plasma display panels, heated rear windscreens, covers for white goods (washing machines, refrigerators etc.), debit, credit, identity and loyalty cards, and many other products. In most of those production processes, high-end screen printing mesh is needed.

Sefar Precision Mesh (PME) has been specially developed to meet these tough industry demands. This new polyester mesh has high elastic modulus, giving a few advantages for screen printing applications. Compared to some comparable mesh types, the PME tension level remains higher during and after stencil making and is ready for use in a shorter time.

EXTENDING STENCIL LIFETIME

During the printing process a higher tension level over a longer period is maintained so a high dimension stability of the printing layout can be achieved, even with long print runs. The stencil lifetime is extended – the higher the tension level, the longer the stencil can be used for printing.

A higher elastic modulus of the polyester monofilament and a higher tensile strength have got additional advantages: with a stronger thread the risk for breakage during stretching is much lower and the achievable tension is much higher. In addition, the printing operation can proceed with reduced snap-off distance and lower squeegee pressure. More precise printing layouts and an increased dimensional stability can also be achieved.

PME is in the initial stage and ready for market introduction. The product range will be gradually incremented to focus on the need of high-end screen printing applications. SP

Bruno Naef is Market Field Manager for Sefar

A membrane keyboard

Further information:
Sefar AG, Thal, Switzerland
tel: +41 71 886 34 10
fax: +41 71 886 35 91
email: printing@sefar.com
web: www.sefar.com

WEB-BASED SOLUTION

Oliver Kammann outlines the features of an automated 'all-in-one' pre-press workflow

K-FLOW'S 'ALL-IN-ONE' AUTOMATED PRE-PRESS SOLUTION, THE K-SUITE, IS BASED ON THE COMPANY'S PRODUCTS FOR INDUSTRIAL PRE-PRESS APPLICATIONS. THE NEW K-SUITE ASP '08 IS A WEB-BASED ONLINE PRE-PRESS WORKFLOW SPECIALLY DEVELOPED FOR INDUSTRIAL PRINTING APPLICATIONS SUCH AS SCREEN, OFFSET OR DIGITAL.

This new online solution does not need to be installed on-site or purchased outright; it works on the principle that the user pays, so that everyone can afford to use this pre-press workflow solution without having to face any major capital expenditure.

Users simply apply for an account with K-Flow and the Suite is theirs – they only pay a small fee for each file passed through the system, and only if that file was in need of corrections or modifications in the first place. Of course, companies may choose to have a Suite of their own – corporate identity branding or dedicated on-site installations can also be obtained.

COMPLETE ACCESS

The K-Suite ASP '08 can be accessed at any time from any web browser in the world. The suite and all its programmes and databases are hosted and administered by K-Flow technicians at the company's secure, state-of-the-art server facility. The Suite provides an easy-to-use administration tool, enabling registered users to configure accounts for further employees, assign credit limits or upload their own machine colour profiles to be used in subsequent colour conversions.

The K-Suite ASP '08 features automatic file upload, checking and correcting, full job data management and advanced colour management and colour conversion to any printing machine, all delivered through a fully customised web front end. It provides immediate web or email feedback about a print file's quality and suitability for a particular decoration process via detailed reports to printers, agents and graphic art designers. It can automatically inspect and correct hundreds of common errors with its advanced pre-flight algorithm. All communication is secure and encrypted, making data transmission over the internet safe and convenient.

MATCHING COLOUR TO PRINT

At the core of the Suite is the improved K-XChange colourserver. K-XChange uses advanced mathematics and DeviceLink profiling technology to achieve its primary objective: visually matching the intended colour of a design to the printing process in question. It generates printing machine profiles and automatically analyses and converts an incoming file to the desired print standard (e.g. ISO, Gracol) or to a specific machine profile, based on custom characteristics (machine type, ink type, substrate type).

K-XChange ensures that the visual appearance of the printed image is kept as close to the client's intended perception as possible. One major benefit is the ability to automatically convert print files from one standard to another, so that files previously prepared for screen printing applications can instantly be technically and colourmetrically converted to a digital printing process.

AUTOMATIC CROPPING

K-Suite ASP '08 also includes the K-Define module to automatically crop incoming PDF files to the required page dimensions for current CTP/CTS systems, based on precise masks for all common substrate formats. Original files can thus be kept intact, without the need for manual editing. The module can be customised with a printer's own templates and corporate design.

K-Suite ASP '08 also includes easy-to-use job data management, allowing registered users to enter all relevant information regarding a certain job, including article type, desired printing technology, number and type of colours, as well as order size and delivery times. All information is linked to the artwork file and stored in a database for access by customer service agents. The Suite can also be linked to existing ERP systems such as SAP or Oracle.

The K-Suite ASP '08 is compatible with printing machines from any manufacturer. It will be demonstrated at the K-Flow stand (hall 9, booth D76) at Drupa 2008 in Düsseldorf, Germany, taking place from 29th May until 11th June. SP

Oliver Kammann is Managing Director of K-Flow

Further information:
K-Flow GmbH, Bünde, Germany
tel: +49 5223 180 93 18
fax: +49 5223 180 93 19
email: info@kflow.de
web: www.kflow.de

CHOOSING THE CORRECT LINE COUNT

In the first of a series of articles on common printing errors, Mike Ruff offers his advice on choosing the correct line count for four-colour process screen printing

AS I ASSIST SCREEN PRINTERS EVERY WEEK IN BECOMING MORE PROFITABLE, I FIND THAT ONE OF THE MOST COMMON CAUSES OF LOST PRESS TIME IN FOUR-COLOUR PRODUCING COMPANIES IS NOT CHOOSING THE CORRECT LINE COUNT.

This one fatal error costs screen printers thousands of lost press hours every year in dealing with issues that shut down production, such as moiré, banding, posterisation and poor image quality. When I ask companies what line count they print, they usually tell me two or three different line counts. Then they always say: "And we are attempting to print …" – the number is usually a very high line count.

I ask them how they came to the decision on the line counts they print and the line counts they wanted to print. The question is normally met with a blank stare. They reply: "That is just what we decided to print." This error in not picking the correct line count is common and tragic because there are line counts that the company can print and line counts the company cannot print. If a company arbitrarily picked a line count that is bad for the mesh and mechanical criteria of the Production Department, the price it pays will be daily press downtime, poor quality and rejected jobs. Line counts should be chosen based on three critical success factors.

VIEWING DISTANCE

What is the viewing distance at which the product will be viewed? Most print companies confuse line count with the word 'quality' – they say things like: "We produce 85 lpi quality and our competitor only produces 65 lpi quality". In reality, line count is not quality; line count only dictates the viewing distance. Also, the larger the dot, the easier it is to print and the 'better quality' the actual reproduction will be. In most cases, a 45 lpi will be much better 'quality' than an 85 lpi print because there is a better tonal range, less moiré and better resolution of the dot.

The lpi should be chosen by using the 'Rule of 240', which is based on applying the same relative viewing quality of a 175 lpi print at 16.5 inches from your eyes. This is the distance you would normally hold a high quality 175 lpi magazine (see Figure 1). To determine the correct line count for the viewing distance of the product, simply divide 240 by the viewing distance to determine the lpi that will appear as a continuous tone at the distance you have selected. This will give you the approximate lpi you need to print – not the exact lpi, but the approximate dot size.

MESH TO LPI MOIRÉ

This is the second factor in picking the correct dot size. If you test 12 line counts in increments of five dots per inch (45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105), you will find that no mesh will give you more than three good line counts. Mesh to lpi moiré looks like Figure 2. You should begin with a mesh count that is recommended for the dot size you are planning to print. This is only an approximation because different screen mesh will elongate differently. For example, a 380 mesh may become a 365 or even a 358, depending on the tension and the manufacturer of the mesh, so the calculation does not work well unless you are measuring the actual thread count after stretching, it just gets you close.

Rule of 240

Principle for establishing a logical LPI for a predetermined viewing distance.

Explaination of the Rule:

The rule of 240 is based on the resolution of 175 LPI 16.5 inches from your eyes. This distance is considered optimum viewing quality at 175 LPI. As we move away from the 16.5 inch viewing distance of holding a 175 LPI magazine in our hand, it is a waste of resolution (and money) if we do not increase the dot size with distance.

Formula:

240 ÷ (The Distance in Feet) = The LPI

or

240 ÷ (The LPI of the Print) = The Distance Dots Will Diffuse.

Example:

What is the minimum viewing Distance of a 45 LPI print?

240 ÷ 45 LPI = 5.33 Feet (64 inches)

CONCLUSION: "A higher LPI than 45 LPI at a 64 inch viewing distance will not improve the image quality because you cannot see the dot."

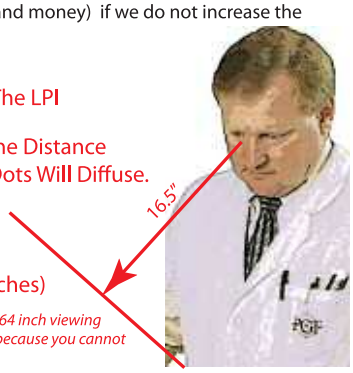
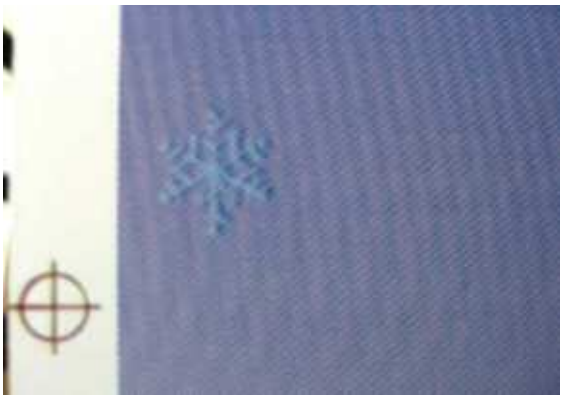


Figure 1: Rule of 240

Mesh Count vs. LPI Moire

Tragic Fact: Most screen printers decide to print certain line counts without any scientific evidence the LPI is compatible with the mesh count. Below is an example of a moire caused by the mesh and line count not being compatible.



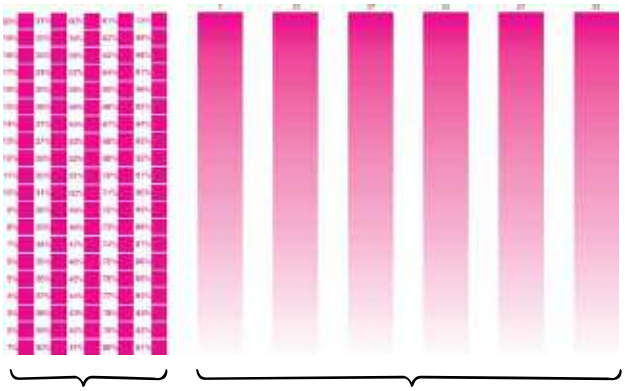
Every mesh count has only a very few line counts (2 to 3) that are compatible with the mesh. Compatible means there are at least three angles 30 degrees apart that are realitively moire free.

Figure 2: Mesh count versus LPI moiré

Test for determining line counts that are compatible with the mesh.

By "Bracketing the intended LPI" with at least 5 line counts lower and 5 line counts higher, a compatible line count can be determined.

Each line count reguires a layout on the press sheet with this information.



This is the 100 Step test to determine the correct film curve.

This is 6 angles 15 degrees apart. The objective is to find line counts that are 30 degress apart with relatively no moire.

Figure 3: LPI and angle test

The way to determine a line count you can print is through 'bracketing' the line count with at least six line counts above or below it with a separation of five dots per line count (45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105). The reason for this bracketing is to determine with each line count if there are at least three clean angles 30 degrees apart based on testing six shifted angles that are 15 degrees apart (see Figure 3). This will test every common angle produced by most RIPs.

Print all these line counts on the same screen at the same time – you will be surprised at the results. You will probably find that the lpi you are printing every day is not the optimum line count for the mesh you are using. Also, this one simple evaluation explains why you have 'unexplained moiré' pop up on a regular basis. Your production people just stop the press, reshoot a screen on a different mesh and then resume printing. This is a major financial drain on the company and it can easily be avoided by just finding the correct line counts in the beginning.

DOT SIZE ENVY

This is the third cause of picking the wrong line count. Salespeople often have clients telling them they cannot print for them unless they can print a certain lpi. The problem is that the print buyer was taught that a higher line count is 'better quality'. Actually, higher line count is only better quality if you are holding a print in your hand or comparing two prints at a very close viewing distance. Dot size should only be investigated after it has been determined whether the line count can be produced moiré-free with a good tonal value range.

Here are three things salespeople need to know about 'dot size envy':

Just because a client tells you your competitor prints a certain lpi, it doesn't mean they actually do. I have personally been told this by clients and when I asked to see a sample of the prints they are currently accepting, the line count is half what the client thinks it is. So the first tip is, ask to see a sample.

Learn the Rule of 240 and ask what the viewing distance is. I have been with salespeople that voluntarily pushed their own production capabilities beyond the limits of acceptable quality by blurting out a line count the customer was not even asking for – so ask.

Be a professional salesperson, not an order taker. Learn to explain lpi, resolution and sell what works best, not what your competitor is saying they can do. Give clients what they need and what you can do well, not what they are blindly asking for. Remember that bad printers do a lot of different line counts poorly, good printers do a few line counts well. Good printers know what they can do well and they do not deviate from it.

CONCLUSION

Remember that line count is not quality; how well you reproduce 256 grey levels is quality. If you are attempting to print line counts beyond your capability, quality goes down, not up. In screen printing the lower the line count the better the quality, so set the line count as low as possible for the correct viewing distance. Find the best line count for your mesh and don't get caught in the 'dot size envy' trap. If you become comfortable with explaining this to potential clients, you will make them much happier and it will add money to your bottom line at the same time.

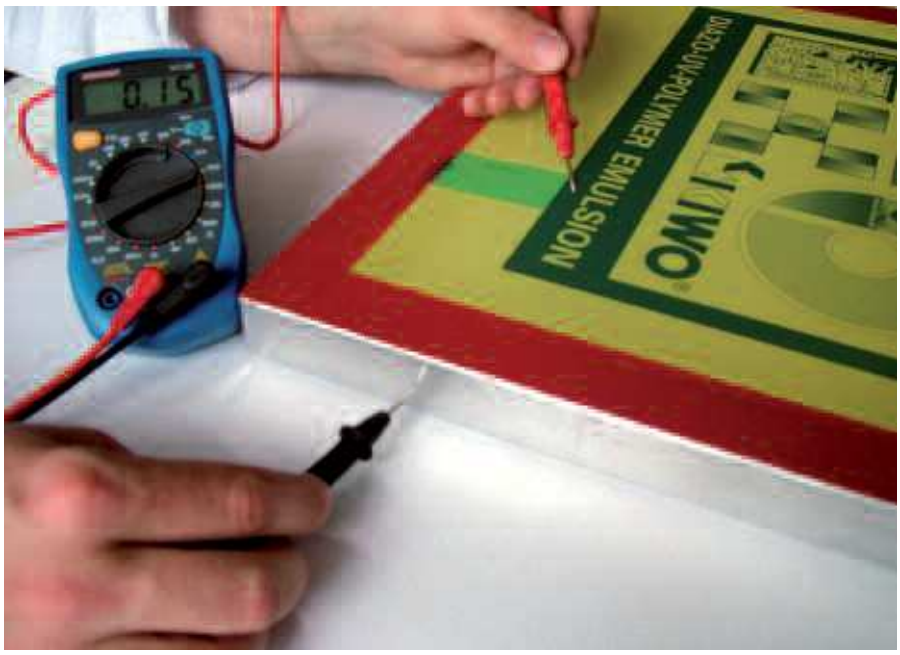
Mike Ruff is Chief Technology Officer for Nazdar Consulting Services

This is the first in a series of articles in which Mike Ruff shares his wide experience of common 'mistakes' made by printers in all areas of their process, and advises on how to avoid them.

Further information:
Nazdar, Shawnee (KS), USA
tel: +1 816 304 9595
email: mruff@nazdar.com
web: www.nazdar.com

STATIC CHARGING IN SCREEN PRINTING

Roland Studenroth investigates the benefits of conductible photoemulsion systems



Measuring electrical resistance with a digital multimeter

THE PROBLEMS WITH STATIC ELECTRICITY WHICH MOSTLY OCCUR IN SCREEN PRINTING EMANATE FROM INK SPUTTERING ONTO THE PRINTED SUBSTRATE. THESE SPUTTERS EXIT AS HAIRLINES FROM THE CORNERS OF LETTERING OR GEOMETRICAL SHAPES. THIS PHENOMENON ESPECIALLY OCCURS WHEN SMOOTH PLASTIC SURFACES ARE PRINTED, WITH FAST PRINTING PROCESSES (CYLINDER PRINTING MACHINES) AND DRY WEATHER CONDITIONS.

Static charging occurs when surfaces are brought very close together (<10 nm) and then separated again, whereby surface charges are also separated and thus charging occurs (positive or negative). As most plastics are insulators, the charges produced cannot discharge and the phenomenon described above occurs.

This can also, depending on the size of the charge, cause great hazards such as, for example, an explosion in a screen washing machine, which can only happen when the stencil or parts of the stencil (for instance the 'trampoline' screens) are not earthed or made conductive. It should, however, be noted that static charging can also occur through flowing solvents (jet application).

INSULATORS IN SCREEN PRINTING

In the screen printing process there are a wide variety of insulators present which make alternating contact and are thus liable to charge separation, i.e. static charging. Usually these are the screen mesh, the photoemulsion, the screen filler, the printing ink, the printing squeegee and in many cases the substrate to be printed, if this is made of plastic.

Individual components can, to a certain degree, be made conductive, but these measures are not usually sufficient – for instance the antistatic treatment of screen mesh, which is eroded through abrasion after the first few prints. Static electricity can also be imported by charged substrates (e.g. through unrolling or winding up). In this case, ion bars or another suitable means for discharging should be installed.

Electrical charging can be countered in photoemulsions if care is taken that no immediate contact between the substrate and the lower side of the stencil is possible. This is done by means of a rough stencil surface, intentionally with particles or a rough emulsion structure. This method of preventing electrostatic charging does not always work properly because of insulators, but charges nevertheless occur depending on the machine setting, and charges cannot discharge.

Sefar PET 1500 120-34 Y mesh – diameter of the dots is approximately 165µm

Sefar PET 1500 120-34 Y mesh – line and space are approximately 30µm

CONDUCTIBLE PHOTOEMULSION

In order to prevent the latter, Kissel + Wolf has developed a conductible photoemulsion, Azocol S 390-05 Conduct, with an ancillary conductible screen filler, Kiwofiller 409-13 Conduct. Both products have been adapted with additives for conductibility, which can be measured with a simple Ohm meter; the target was to achieve an average resistance of less than 1 MΩ. Consistent values are not possible in screen printing, as when measuring the resistance or conductibility (= 1/Ω), parts of the mesh and the emulsion build-up thickness are included. A rough surface structure to avoid charge separation is also present.

If we suppose that the screen frame is made of metal and the printing machine is earthed, then the combination of a conductible emulsion / screen filler (the latter applied up to the frame) results in a completely conductible stencil and no more problems with charging should occur when printing charge-free substrates. Instead of the screen filler, the conductible photoemulsion can also be used as an alternative, but here the screen should be exposed again.

Dr Roland Studenroth is Head of Research for Kissel + Wolf

Further information:
Kissel + Wolf GmbH, Wiesloch, Germany
tel: +49 6222 578 0
fax: +49 6222 578 200
email: info@kiwo.de
web: www.kiwo.de

NO ROOM FOR ERROR

Jim Hingst discusses the ease of printing onto polycarbonate films compared to other plastics

Billiam Barnes of Falcon Enterprises

TO ERR MAY BE HUMAN, BUT WHEN YOU PRINT POLYCARBONATE OVERLAY PANELS AND NAMEPLATES FOR UNCOMPROMISING OEM CUSTOMERS, THERE IS NO FORGIVENESS. AT LEAST, THAT'S BEEN THE EXPERIENCE OF VETERAN SCREEN PRINTER BILL BARNES, VP OF PRODUCTION FOR FALCON ENTERPRISES IN PINELLAS PARK, FLORIDA (USA).

According to Barnes, maintaining high standards is not an impossible dream if you have the quality structure in place and the discipline to unfailingly follow established procedures. Compared to other plastics, such as polyesters, Barnes says that polycarbonate films are much easier to print.

Polycarbonate has a naturally high dyne level, which means that better ink adhesion can be achieved. Unlike other plastic films, such as polyester, polycarbonate films require no surface pre-treatment before printing and, since polycarbonate withstands higher curing temperatures than polyester, the stability of these films allows the printer to maintain better registration.

Print failures can still occur and incompatibly of materials is a major cause. "Our first steps in quality control are to qualify the raw materials: the inks, the film and the transfer adhesive," Barnes says. "All three components have to work together. The ink may have good adhesion to the film, but after you add transfer tape to the equation, it can be a whole new story." The adhesive can weaken the anchorage of the ink.

SELECTING MATERIALS

In selecting materials, Barnes suggests contacting distributors and manufacturers for recommendations. The manufacturers conduct extensive tests of the compatibility of the primary components of graphic panels: the ink, the polycarbonate film and the transfer adhesive. Barnes believes in keeping the lines of communication with his vendors wide open. That way he stays up-to-date with technical developments.

The ink manufacturers can provide ink recommendations and instructions on processing. "That doesn't mean that you should take another's recommendations at face value," Barnes cautions. To ensure compatibility of the ink with the film and the transfer adhesive, the screen printer must conduct his own testing. For in-house testing, distributors can supply sample sheets of film.

After printing some sample sheets of polycarbonate, Barnes suggests allowing the ink to cool before performing an ink adhesion test. "Any type of testing conducted prior to production should closely approximate shop conditions," he says. "Screen printing is a process of many different variables, any of which can affect the quality of finished product. If you alter any of these variables, you can affect the finished product."

TESTING ADHESION AND COMPATIBILITY

Tests at Falcon Enterprises include checking the adhesion of the ink to the substrate, inter-coat adhesion (the bond of one layer of ink to another) and compatibility of the tape with the ink. "In testing the adhesion of the ink to the film, we generally run a cross hatch test," Barnes says. "Testing doesn't stop there. After transfer adhesive is laminated to a part, we also run peel tests using an Instron tester. Not everybody has this equipment in their shop. This gives us a big advantage."

The cross hatch test consists of scoring the printed ink many times with an Xacto knife and then scoring the ink again over the first set of lines at 90° angle. Using a plastic squeegee, an aggressive tape such as 3M Brand #600 clear tape is rubbed over the scored cutlines. The tape is then pulled off 180° against itself in one quick motion. If any of the ink comes off, the adhesion of the ink to the substrate is insufficient.

Barnes believes that testing doesn't end when you first qualify the raw materials. "Testing the compatibility of the components is just the first step in a quality programme," says Barnes. "Testing throughout the manufacturing process is critical." Barnes believes that it is better to sacrifice a few parts in testing so he can discover a problem in his plant, rather than hear about it later when the product is out in the field. Typically, 3% of the parts are tested. This percentage, of course, is factored into the job – it's a small price to pay for high quality work.

Barnes also advises that once you find a combination that works, you stick with that winning formula. Details of every job are well documented so that nothing is left to chance when duplicating a reorder. Repeatability of results depends largely on reproducing all of the variables involved in printing. In addition to screen tension, Barnes suggests recording key information on a production order, such as mesh, ink formulation and cure rate. "Running a job for the first time is sometimes a learning experience," he says. "With good documentation, you won't repeat any mistakes when you repeat the order."

STORING MATERIALS

Although polycarbonate films typically have a much longer shelf life than other plastics, Barnes has learned through experience that ink adhesion can change as the plastic ages. For this reason, Falcon Enterprises stores all of its materials in a temperature and humidity controlled environment. "In the past, we have printed on one lot of polycarbonate and have had great ink adhesion, only to print the same job on the remaining sheets with poor results," says Barnes. "This is just another reason that it is important that you 'test, don't guess'".

Barnes feels that sales staff must be involved in production planning and committed to the quality process. "Screen printing is a business of details," he says. "We expect our salesmen to do their homework, to ask the right questions and

have a clear understanding of the job." These key considerations include investigating the environment to which the graphic is exposed, the durability requirements of the job and the layout. Any pre-production testing should check the compatibility of the polycarbonate with any chemicals that it will probably come in contact with during daily use, including acids, petrochemicals, solvents and cleaning chemicals.

INK CONSIDERATIONS

Both solvent-based or UV screen printing inks adhere to polycarbonate well. Barnes says that when they had used solvent-based inks in the past, ink adhesion wasn't an issue "because the solvent in the ink would chemically bite into the film." Although problems with solvent inks were rare, a poorly cured ink could cause poor ink adhesion. Some solvent ink systems may take some time for the solvents to evaporate fully and the ink to achieve full adhesion.

The key to success in printing with solvent inks is to completely dry the inks so there are no residual solvents. Force drying of the inks at temperatures between 130° and 150° F (54-66°C) is the preferred method. Some potential problems that can arise from insufficient drying are poor ink adhesion, stress cracking and sheet curl. "Thinner sheets are more prone to curling," Barnes says. "This is really a minor problem that can be easily fixed by sending the sheets down the dryer. With a little extra curing, curled sheets will flatten out again."

PRINTING WITH UV INKS

In recent years, Falcon Enterprises has transitioned to UV inks, which are preferred by most for printing on polycarbonate films. In many respects, UV ink systems are much safer than solvent-based inks. Other advantages include exceptional print detail and improved abrasion and chemical resistance. "UV inks have great advantages," Barnes says, "but you have to monitor ink adhesion more carefully."

When printing with UV inks, Barnes recommends using a monofilament polyester mesh with a high mesh count in the range of 355 to 390. Using a fine mesh screen will ensure the reproduction of fine detail and a thin deposit of ink. Of course, other variables can affect the thickness of the ink deposit; these include stencil thickness, ink viscosity and squeegee durometer.

When printing with UV inks, thinner deposits of ink are also better because the UV light can more easily penetrate and more thoroughly cure the layer of ink. If the ink deposit is too thick, the UV light will not fully penetrate the ink. This can mean that the layer of ink that is making contact with the substrate is not cured or is not fully cured. Usually this uncured or under-cured ink is too soft to bond or adhere to the substrate.

It is often possible to tell whether the ink is properly cured by simply scratching the surface of the ink with a thumbnail – a properly cured ink will resist scratching. Another non-scientific test is the thumb twist test: just press a thumb against the ink and give it a twist. If the ink is not thoroughly cured, a hardened layer of ink can slip over an uncured layer of ink. A properly cured ink also should not feel tacky, but should feel dry to the touch.

EXPOSING UV INK

Many printers believe that it is not possible to overexpose a UV ink, and the more exposure the better. "This isn't necessarily the case," Barnes says. "Over-curing a UV ink can cause as many problems as under-curing. As the exposure of the UV ink increases, the ink film becomes harder. Overexposure of the ink can embrittle it, which could lead to some fracturing of the surface of the ink."

The initial layers of ink often receive additional exposures of UV light as the subsequent ink layers are printed and cured. With each exposure, the initial layers harden so it becomes more difficult for the subsequent layers of ink to bond to them. Poor inter-coat adhesion can cause delamination of the graphic overlay from the substrate to which it is adhered.

continued over

Another common problem occurs when printing a polycarbonate film with several colours. Not only must the ink bond to the base polycarbonate film, but multiple layers of ink must also bond together. The ability of one layer of ink to bond to another is commonly referred to as 'intercoat adhesion'. In performing a cross hatch test, if one layer of ink splits from another, it could indicate that the ink layers are poorly adhering to each other.

Different types of UV curing units produce UV light of varying wavelengths. Some wavelengths of light can yellow and oxidise polycarbonate films. Overexposure to UV light can also harden and oxidise the surface of polycarbonate film. This oxidation of the film's surface can inhibit the ink's ability to bond to the film. Do not, however, under-cure the ink layers in an attempt to prevent oxidation from occurring – each layer of ink must be properly cured for good ink adhesion. Consult the ink manufacturer or distributor for recommendations regarding which type of curing unit is best for an application.

Poor ink adhesion to polycarbonate films often results from one of three reasons: the ink and the film may not be compatible, the ink may be under-cured or the surface of the polycarbonate may be degraded. In the curing process, exposure to UV light can cause the outer surface of the polycarbonate films to degrade. This commonly occurs when polycarbonate films are exposed to shorter wavelengths of UV light in the range of 200 to 260 nanometres (nm). Degradation of this outer surface of the film can cause ink adhesion problems.

Several variables affect the curing of UV inks, which include the type of curing lamps, the age of the lamps, the conveyor belt speed and the thickness of the ink deposit. Some colours absorb light better than others. For this reason, different ink colours can require different or varying degrees of UV energy to properly cure. Black, for example, often requires higher energy to cure, because the density of the pigment can block the light from penetrating all the way through the ink layer. Ink manufacturers try adjusting their ink formulations to compensate for this, so that the different colours cure at the same rate.

DEALING WITH STATIC

Many plastics, such as polycarbonate films, are prone to picking up a static charge. Static in the polycarbonate sheet can attract dirt, which can result in printing defects. Static electricity can also cause a printing problem known as spider webbing. Air conditioning and humidity control helps in minimising static.

Barnes recommends that humidity in a plant should be at least 15-20%. Some ink manufacturers recommend much higher ambient humidity, not only for the print area of a shop, but also the storage area. Air filters, deionised air and good housekeeping practices can also reduce contamination.

Barnes says that over the years the company has tried many different types of static eliminators. "The type of static eliminator that blows deionised air on the sheet has worked the best for us," Barnes says. "This type of unit is also used frequently by flexo and offset printers." This type of unit shoots negatively charged particles onto the sheet as the film passes underneath a bar. By neutralising the static charge, Falcon can prevent spider webbing. Barnes notes that controlling static is critical when printing panels with small copy and sharply defined edges.

Some inks can also build a static charge. To help dissipate the static, some ink companies recommend adding a drop or two of dishwashing liquid to the ink. Before trying any of these remedies, be sure to carefully read any pertinent technical literature or contact a representative of the ink company.

FINISHING THE JOB

Before laminating the transfer adhesive, shearing or die cutting the polycarbonate film, Barnes says that it is always good practice to wait 24 hours after printing, whether you use solvent or UV inks. This waiting period allows the ink system to completely cure. Steel rule die cutting is usually the easiest part of the

job. Barnes says that polycarbonate films can be more easily die cut, with less fracturing of the edges than other types of plastic films, such as polyesters.

"The toughest part in die cutting is specifying the right die for the job," says Barnes. In ordering steel rule dies, good communication with the die-maker will ensure the right tooling to satisfy requirements. The most critical information is the type and thickness of the material to be cut, whether or not the film will be laminated with a transfer tape, the quantity to be cut, how often will the die be used, the rule type, the tolerances for the job and the delivery date required. The manufacturer will also need to be told whether the die should be filled with foam rubber to eject the cut parts from the tooling.

For films thinner than 0.375 mm, Barnes recommends using a 2 point or 0.7 mm rule and for thicker films, a 3 point or 1.0 mm rule should be used. Using rubber strips on either side of the die rule aids the ejection of the part.

RULES FOR CUTTING

A number of different rules such as the centre bevel rule, the facet bevel rule and the side bevel can be used in cutting polycarbonate films. "In most cases, we order a single bevel blade with the bevel to the scrap side," Barnes says. "Usually a rule with a bevel on both sides tends to distort during die cutting. The only time we order a double bevel blade is when we're cutting really thick sheet, such as 60 mm or thicker."

The unique physical properties of polycarbonate make it more difficult to cut than other plastics. Rather than shattering, polycarbonate absorbs the impact of the die and tends to 'push back' when pressure is applied. As the plastic pushes back, it can distort the rules as well as distorting the part being cut. To aid in cutting polycarbonate films, a long ground bevel edge on the rule will minimise the resistance of the plastic film.

Die cutting polycarbonate becomes more difficult as the plastic film becomes thicker. "Cutting 15 mm and 20 mm polycarbonate can be especially challenging, compared to cutting 10 mm product," Barnes says. "When films are laminated with a transfer adhesive, the cushioning effect of the adhesive adds to die cutting difficulty."

Jim Hingst is Business Development Manager for R Tape

Further information:
R Tape, South Plainfield (NJ), USA
tel: +1 219 929 5581
fax: +1 219 929 1527
email: jhingst@rtape.com
web: www.rtape.com

ESMA EVENTS IN 2008

ESMA is pleased to announce that the following events, to be staged in cooperation with Chameleon Business Media, will take place in 2008:

CTS and Digital Workflow 2008: 4-5 November 2008 in Neuss (Düsseldorf)

European Membrane Switch Symposium 2008: 6 November in Neuss (Düsseldorf)

More details will be published in future issues of this magazine – to stay updated, subscribe for free (see page 29 of this issue).

Figure 1: common line printing problems

WHAT IS INTELLIGENT INTERWEAVING?

Bryan Collings discovers how a wave process can be used to put ink on the substrate

I AM SURE THAT, LIKE ME, YOU HAVE HEARD OF TALK OF IMPROVED DIGITAL PRINTERS THAT USE A WAVE OR WEAVE PROCESS TO PUT THE INK ON THE SUBSTRATE. UPON SEARCHING THE INTERNET I DISCOVERED AN ARTICLE BY THE WELL-RESPECTED INDEPENDENT RESEARCHER, NICHOLAS HELMUTH, AT FLAAR IN THE USA. THE VALUE OF FLAAR BEING AT A UNIVERSITY IS THAT THE STUDENTS AND FACULTY ARE DOING THE REVIEWS, AND EVALUATIONS ARE INDEPENDENT AND NEUTRAL. THEY HAD BEEN RESEARCHING THE WEAVE TECHNOLOGY DEVELOPED BY MUTOH AND WERE IMPRESSED, SO I CONTACTED MUTOH AND ASKED TO LEARN MORE.

I was invited by Nick Decock to visit the company's European manufacturing and marketing centre in Ostend (Belgium) to meet with Stephan Heintjens, the Product Marketing Manager, where I got an insight into the wave process of digital printing and the 'Intelligent Interweave' i^2 developed by Mutoh.

PROBLEMS OF STRAIGHT LINE PRINTING

Interweave printing, as with most good ideas, was developed to solve specific problems. With straight line printing there are certain common problems:

- Banding which tends to be caused by inaccurate feed adjust of the substrate, causing either an over or under deposition of ink at the boundary between where each pass of ink is laid down (see figure 1). This is often cured by printers slowing their machines down, which tends to hide the mismatch effect.
- Bleeding: as the dot size increases, with solvent-based inks there tends to be more bleed, which degrades the sharpness of edges where sharp colour changes occur. This is also curable by printers switching to higher quality coated substrates.
- Banding which tends to be caused by error margins that have been multiplied when printing in a mode where the printer is jetting ink while the head carriage is moving from left to right, and vice versa. The ink jetting order, slight misalignment, drying effect etc. then cause connecting bands that reveal a slight colour difference.

The solution to these common problems is available at a cost, so the printer's profit margins are eroded.

THE WAVE PROCESS

The interweave or wave process eliminates a hard edge between each pass of the print head, making the process more tolerant of inaccurate substrate feed i.e. a slight mis-registration between passes of the print head is compensated for. When it comes to bleed problems, the intelligent interweave firmware feature detects hard boundaries between colour blocks and compensates with a more intelligent dot placement and ink flow to eliminate bleed, even on uncoated substrates. By doing this automatically rather than by operator trial and error, the level of reject prints drops dramatically. The wave pattern can be seen in figure 2.

The weaving also pays off during bi-directional printing as its dot order selection vastly reduces or even eliminates the band to band tone difference.

Almost all current model printers, when set up correctly by a highly skilled operator situated in a controlled environment and fed with good quality substrates and inks, will produce very similar high quality results. However most digital printer operators do not have the top level technical skills of the manufacturers' technicians seen at trade shows. This skill shortfall causes printers to run their machines at less than optimum settings for each job, which in turn lowers efficiency and reduces profit margins.

In many print shops the norm is to have three or possibly four sets of print settings which are used to cover 99% of jobs usually undertaken. For a modern digital printer this is close to criminal negligence. A highly sophisticated piece of equipment is being used in a basic, simple way to the detriment of profits.

A LEVEL OF AUTOMATION

Research undertaken by Mutoh showed that most users of digital printers would be very open to a level of automation to help overcome operator skill shortfalls. As an analogy one can consider modern SLR digital cameras, which are still fully adjustable if the operators have the skill to determine their own settings. However for those less able people, they have a number of pre-set options: portraits, scenic views, night shots, action shots etc.

Based on the research, Mutoh decided to develop a semi-automatic option for the

Figure 2: non-wave and wave comparison

The Mutoh headquarters

interweave technology which is called Intelligent Interweave i^2. To use it effectively, a printer must eliminate as many variables as possible. For example, Mutoh inks must be used, workshop relative humidity must be between 40% and 65%, and the temperature should be between 20º and 30ºC. However having eliminated a lot of the variables, it becomes a simple matter of choosing between alternatives:

- What is the viewing distance? <3m, >3m, >5m.
- What is the image type? Sign / quality or picture / speed.
- What is the image content? A lot of small detail or less detail (not relevant for viewing distances greater than 5m)?

Having chosen these variables, the machine firmware then determines the optimum settings and speed to maximise the efficiency of printing, thereby maximising profits for the printer. Of course this does not cover all cases and the manual explains certain alternatives for slow drying media and media which is difficult to print on. In essence the range of alternatives would give a speed range on the new Blizzard, which has been designed around this technology, of between 3.5 m^2/h and 36 m^2/h.

Intelligent interweave is new technology; however printers are encouraged to review all manufacturers' offerings before making a decision.

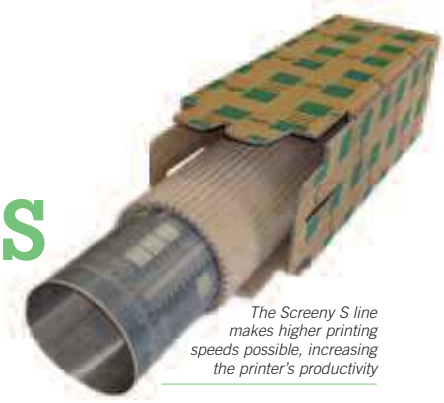
Information on FLAAR can be found at www.wide-format-printers.org/BowlingGreenStateUniversityOhio/BGSUdigitalimaging.htm

Bryan Collings is Publishing Director of Specialist Printing

Further information:
Mutoh, Oostende, Belgium
tel: +32 59 561400
fax: +32 59 807117
email: mutoh@mutoh.be
web: www.mutoh.be

ENHANCING AND CUSTOMISING PRODUCTS

Dario Schmidhauser outlines the benefits that screen printing technology can bring to product packaging



The Screeny S line makes higher printing speeds possible, increasing the printer's productivity

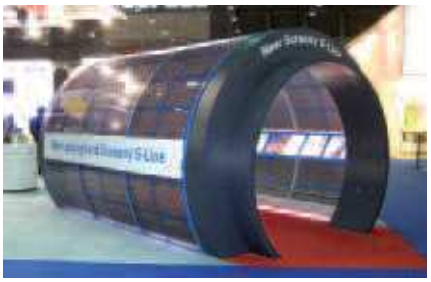
IN OUR MODERN CONSUMER SOCIETY, CUSTOMERS ARE SPOILT FOR CHOICE. THIS INEVITABLY LEADS TO FIERCE COMPETITION. ONE STRATEGY ADOPTED BY MANUFACTURERS IS TO FOCUS SINGLE-MINDEDLY ON CREATING STRONG BRANDS. PACKAGING PLAYS A KEY ROLE HERE – IT HAS THE DUAL FUNCTION OF ATTRACTING ATTENTION AND INFLUENCING POTENTIAL CUSTOMERS TO THE GREATEST POSSIBLE EXTENT, HENCE THE EVER-INCREASING QUALITY AND AESTHETIC DEMANDS.

Creating a unique label is an excellent way of enhancing and customising products. Screen printing is ideally suited to this purpose, enabling printers to combine strong colours, fine lines and dense colour areas. Applying a coating allows special relief and other effects to be created. When combined with hot foil embossing, the options are virtually unlimited. Scented coatings, thermochromatic inks and glitters are just a few examples of new screen printing applications.

In addition, screen printing enables Braille to be applied to a label. A number of national and international guidelines stipulate that products damaging to health or pharmaceuticals that are intended for public use must be labelled in Braille. This can be done using screen printing because of the thick coating required.

High-quality labels enhance and customise products

The demonstrations of Gallus' RCS 430, EMS 340 and EM 280 generated enormous interest at Label Expo 07 in Brussels



The new Screeny S line makes its appearance at the trade fair

Other effects can, of course, also be produced using this technology. A product is much better placed to attract customers if it employs what is known as the touch & feel effect, and 3D label designs (high builds) help a product to stand out from the many other items vying for their attention. It is a proven fact that customers are far more likely to make an impulse buy if visual appeal is combined with a tactile effect. This can only be achieved using screen printing.

NO COMPROMISE ON FLEXIBILITY

Label printers demand longer service life, reusability and stability without compromising flexibility – the Screeny S line fulfils these requirements. Overprinting images is no longer a problem. The flexibility of the screen means that the ink seals very well at high ink edges and prevents the ink 'bleeding' at the edges.

The springhard screen also minimises the impact of disruptions to the printing process. If the substrate is dirty or has poor quality splicing, the effect on the print result is only temporary. Although the label concerned is unusable, the printing plate remains unaffected, springs back and continues to print normally. The result is fewer machine stoppages.

Screeny S line screens are also unaffected by kinks. Handling is therefore faster and easier, resulting in reduced costs. Higher printing speeds are possible, which in turn increases the printer's productivity.

The woven screen structure ensures the best possible ink flow. The ink channels are more than just holes in the backing material – ink can flow through the screen in all directions. This structure also allows a more stable weld seam as the woven backing material allows the weld thread to be better incorporated in the fabric.

A SUCCESSFUL APPLICATION

The Schreiner Group is a leading international manufacturer of marking solutions and a major company in the medical and pharmaceutical industry. It has a comprehensive knowledge of flatbed and rotary screen printing; several presses are fitted with rotary screen printing units. For this, the Schreiner Group uses Screeny and the Screeny S lines.

"We did try out a rival product and subjected it to comprehensive testing. However, we now use only the Screeny S Line," said Mr Meckel, project engineer and deputy production manager at the Schreiner Group. "I could talk at length about ink flow properties and technical details, but the truth is much more straightforward – Screeny S Line simply prints better. Our printers are delighted with it."

"We favour the Screeny S Line because it ensures fewer machine stoppages and fewer print problems while providing perfect edge acuity and a clean print image from the proof stage onwards," commented Mr Tamfall, prepress group leader. "Screeny S Line screens are also much easier to handle during prepress."

"The ink flow and edge acuity of the Screeny S Line are very impressive," Mr Petratschek, prepress production manager, explains. "Other benefits of the new product range include its dimensional stability, general stability and flexibility."

Dario Schmidhauser is Product Manager Screeny for Gallus

Further information:
Gallus, St Gallen, Switzerland
tel: +41 71 242 86 86
fax: +41 71 242 89 85
email: dario.schmidhauser@gallus.ch
web: www.gallus.ch

THE SPECIALITY SCREEN PRINTER'S SECRET WEAPON

Edward Branigan details how simple elements can be used to achieve extraordinary effects in screen printing

THE EXPLOSION OF TECHNOLOGY IN SCREEN PRINTING ON TEXTILES IN THE LAST 15 YEARS HAS TAKEN APPLICATION METHODS IN COMPLETELY NEW AND UNEXPECTED DIRECTIONS. THE INTRODUCTION OF NEW INKS SUCH AS HIGH DENSITY COUPLED WITH THE ADVANCES MADE IN TRADITIONAL INK, SUCH AS FORMALDEHYDE-FREE DISCHARGE, AND THE RESURGENCE OF WATER-BASED INK AND METALLICS HAS BEEN A BOON IN CREATING NEW OPPORTUNITIES FOR GARMENT PRINTERS.

In machinery the growth has been spectacular. The birth of the mega-production shops of the 1980s fuelled the surge of technology and specialist printing capabilities. The development of in-line foil and flock, RF welding machines capable of bonding many different types of material to garments, images etched directly onto garments using lasers, digital inkjet printers that print on darks or lights and the integration of digital printers with traditional screen printing systems also promise some exciting possibilities.

APPLICATIONS AND EMBELLISHMENTS

No longer is the title 'Screen Printer 'sufficient – printers must now become 'Garment Embellishers'. Once a print is combined with another decoration such as a sewn-on patch or a sonic weld, it becomes an 'Application'. The nomenclature is changing in tandem with the technology as 'Garment Application' and/or 'Embellishment Specialists' take the floor from 'Garment Printers'.

Printers find themselves in a world populated with an array of tools devised to give them an edge over competitors. Couple this with increased consumer demand and knowledge and it can be clearly seen that graphics on t-shirts is no longer the novelty item sold at the beach resort or the shirts for the local soccer club – the screen printing medium is now taken seriously as a modem of creative expression. With the advent of the internet, consumers' desire to personalise the graphics that they wear is being turned into a reality.

HEAT TRANSFER

An often overlooked but extremely useful tool for the speciality screen printer is the heat transfer machine. Traditionally heat transfer machines were used, as the name implies, for applying heat transfers to hats and t-shirts. The development of dye-sublimating printing was also made possible using this technology. In a modern screen printing facility, transfer machines would be used either in-line or standalone to apply transfers, foil, fabric patches etc. In fact, many types of material and fabric can be coated with an adhesive and then applied to a garment using a heat transfer machine.

They can also be used for adding textures and other special effects. A simple step such as crinkling up a piece of foil before adhering it to a shirt gives a distressed vintage look. Crinkles and other patterns can be added to High Density or Plastisol by using the same procedure for foil but using gloss paper instead. Foil can be added to caviar beads already adhered to the shirt by giving a slight 'kiss' with minimal pressure. By simple adjustments to the heat, time and pressure settings, more or less foil can be added, the beads can be melted or crushed or the foil can be made to appear to have fused with the beads.

Knowledge of a particular ink product's characteristics and behaviour used in conjunction with the straightforward mechanics of the heat transfer machine can, with a little ingenuity, offer the artist or printer endless possibilities for special effects using a simple single colour graphic.

THE PATINA EFFECT OUTLINED

'The Patina Effect', a technique developed at International Coatings' R&D lab, is now outlined:

Figure 1: Step 1

Step 1 (see figure 1): Place a crinkled-up piece of pellon material on the print area of the pallet. Make sure that there are both large and small creases and that they cross over the print area.

Figure 2: Step 2

Step 2 (see figure 2): Gently pull some pallet peel across the creased pellon material. Adhere the material to the sides of the pallet using the adhesive backing. Do not push down on the pellon material; it should be soft and spongy.

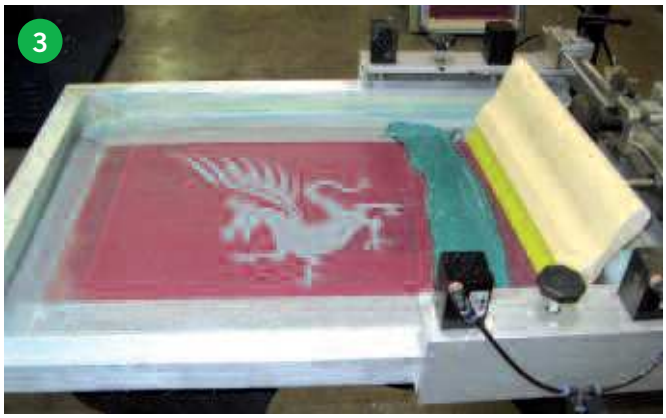


Figure 3: Step 3

Step 3 (see figure 3): Burn the image on to a 40 mesh 400 micron screen. Off contact should be set at zero. Use a 70 durometer squeegee. The inks used are International Coatings' products:

Formula = Granite Base 50%
96 LF Metallic Silver 27.5%
7468 Green Ultramix Color Concentrate

Figure 5: The printed image shows the ridges and creases left behind

The printed image will show the ridges and creases left behind by printing over the uneven surface of the pellon material **(see figure 5)**.

Figure 7

This particular design **(see figure 7)** was done using copper foil, but any combination of colours can be used.

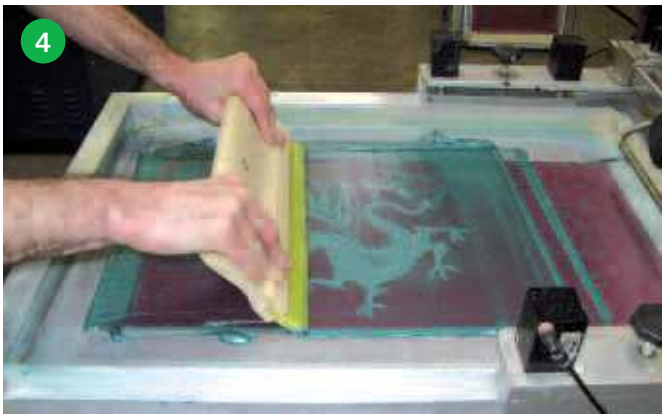


Figure 4: Step 4

Step 4 (see figure 4): Using approximately a 45 degree angle and a lot of pressure, print the image. You will feel the bumpiness of the pellon material on the squeegee as you pass over it. When pulling the screen away, some of the ink will stick in the mesh and pull up with the screen; this is the intention of the zero off contact setting.

Figure 6: Step 5

Step 5 (see figure 6): After curing the image at 330 degrees for 90 seconds, place the printed shirt onto the platten of the heat transfer machine. The machine should be set at 350 degrees, 15 psi with a dwell time of 2 seconds.

Figure 8: Step 6

Step 6 (see figure 8): Peel the foil hot. The minimal pressure and dwell time used, combined with the ridged texture of the print, only allows the foil to adhere to the higher areas and not the low.

Figure 9: Step 7

Step 7 (see figure 9): After the foil application, the shirt should be passed through the drier again. The heat setting should be increased to 370 degrees for 90 seconds. This will cause the foil to melt and take on the contours of the ink ridges.

DO YOU HAVE A SIMILAR GUIDE?

If your company has a step-by-step process that may interest the readers of *Specialist Printing*, please contact Bryan Collings (**bryancollings@specialistprinting.com**) and we may feature it in a future issue of this magazine.

Figure 10: The finished piece

Step 8: Figure 10 shows the finished piece.

Figure 11 (opposite page) shows the copper foil melted over the ink ridges.

Figure 12 (opposite page) shows another example of a creased texture achieved using a heat transfer machine. In this case the image was pressed with silicone paper which was crinkled beforehand. The machine setting was 350 degrees, 40 psi, 10 seconds.

Figure 13 (opposite page) is another close-up of the same image, showing in clearer detail the effect achieved.

These are only two examples of the many types of texture or application that can be achieved. The screen printer who wishes to

Figure 11: The copper foil melted over the ink ridges

Figure 12: An example of a creased texture achieved using a heat transfer machine

Figure 13: The effect achieved shown in clearer detail

specialise would do well to cast his or her eye around their own environment when seeking out new tools of the trade. Simple elements such as a piece of copy paper or a wallpaper brush can be used to achieve the most extraordinary effects – results that would have seemed completely unbelievable to our colleagues who plied their trade in the decades leading up to the 1980s. SP

Edward Branigan is Print Product Applications Manager for International Coatings

Further information:

International Coatings, Cerritos (CA), USA
tel: +1 800 423 4103
email: EBranigan@iccink.com
web: www.iccink.com

DO INK PHYSICAL PROPERTIES MATTER?

Peter Saunders investigates how the physical properties of ink are affected by formulation and chemistry, in turn affecting jetting and print quality

MOST USERS THAT HAVE COME INTO CONTACT WITH PRINTING INKS CAN QUICKLY IDENTIFY THAT INKJET INKS ARE JUST A LITTLE BIT DIFFERENT. IT IS EASY TO SEE THAT INKJET INKS ARE 'THIN' OR MUCH LESS VISCOUS THAN INKS USED IN SCREEN PRINTING, SO PHYSICAL PROPERTIES MUST BE IMPORTANT. IN THIS ARTICLE WE WILL EXAMINE HOW SOME OF THE PHYSICAL PROPERTIES OF INKJET INKS AFFECT JETTING AND, MORE IMPORTANTLY, THE ASPECTS OF JETTING THAT AFFECT PRINT QUALITY. WE WILL ALSO LOOK AT THE INTERACTION WITH PRINT HEADS AND THE DESIGN AND CONTROL OF PRINTING EQUIPMENT WHICH CAN INFLUENCE ULTIMATE PRINT OUTPUT.

We shall concentrate on ultra violet curing inks. The distinguishing feature of UV curing ink technology is the ability to almost instantaneously change the phase of an ink from a very mobile liquid to a highly resistant solid film. The change is brought about by rapid polymerisation within the ink film. The chemistry involved with the technology is important to consider as the physical properties and responses of an ink are, to a large extent, based on the chemistry employed in the ink.

VISCOSITY

As we know, this is the headline property of inkjet inks and everything starts here. If an ink is too viscous to break up into discrete droplets in a stream, then it will not perform as an inkjet ink. An illustration would be the difference between a stream of water poured from a watering can in the garden and trying to use the same sprinkler head to pour something like engine oil for your car – the water forms an array of water droplets, but the oil would 'string', forming long streams.

Viscosity is a temperature-dependent property, so it is important that the ink has the correct viscosity at the temperature at which the print heads are being operated. UV inkjet inks are generally run between 40 and 50 degrees Celsius and over this range, ink viscosities are generally in the range 18-12 centipoise.

In general, as the viscosity is reduced in the operating range, the size of the inkjet droplet increases. If the drop size is inconsistent or not well controlled, print quality and resolution can be adversely affected and, even more importantly, highly visible colour changes in the print can result. Running the print heads at higher temperatures means that ambient temperature conditions in the print room do not affect the jetting temperature.

Imagine that in some regions, daytime inside temperatures can vary from 20 degrees to 35 degrees or more. If this were the only influence on the print head temperature, the ink viscosity would vary widely; this would mean that files printed one day would vary from those printed earlier or later. It could also mean that colour within a print job could change during the printing as the temperature in and around the printer increases.

The reasons for the change in drop size, or more accurately mass, with viscosity are complicated, but in simple terms the movement of the piezo crystal in the print head transfers energy to the ink and this energy is more efficiently transferred through lower viscosity fluid, and droplets require less energy to break up when the viscosity is lower.

UV inks rely on small links called monomers (functional hydrocarbon derivatives) to link together to form long chains when exposed to UV light. The relative size or chain length of the monomers can affect viscosity. Longer length monomers lead to higher viscosity, so the selection of monomers with stable and tightly specified chain lengths is essential – as we have seen, any variability in the control of viscosity leads to print defects.

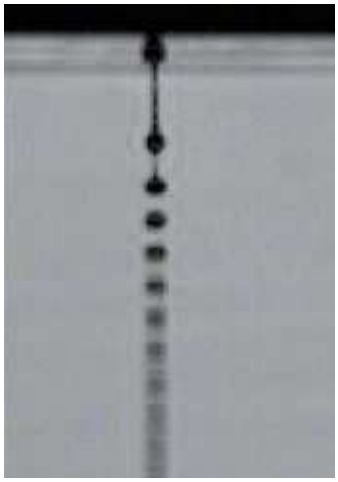
Longer chain monomers tend to lead to difficulties in the formation of droplets themselves and poor break-up or separation of drops. When droplets do not separate correctly, drops either form large 'ligaments' between themselves, which create jetting stability problems, or a range of 'satellites' can be formed.

Satellites are sub-drops which are smaller than the normal droplets and land on the substrate in random positions. Since satellites are smaller, their flight to the media is more affected by air flow and air resistance, so their presence can lead to the formation of spray, which can be seen on prints as poor edge resolution and poor text sharpness.

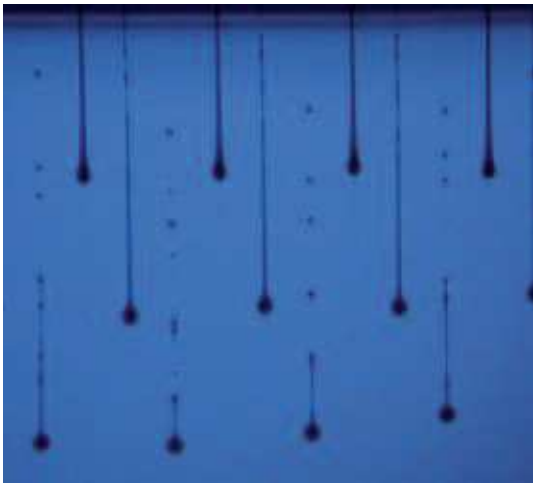
Satellites can also change the apparent shape of the main droplets when they hit the media. If the satellite lands close to the main droplet, the 'dot' on the media can look comet-shaped, which can increase image quality problems and even lead to banding effects.

SURFACE TENSION

Surface tension is a property which acts at the interface between the ink and other materials. The interface between the ink and the air is of critical importance. If ink has too high a surface tension, more energy is required for inkjet droplets to break free from the body of the ink at the nozzle. This can lead to inconsistent drop sizes. Surface tension also influences the separation of droplets and the consequences can be similar to those discussed above with ligament and satellite formation.



Satellites are smaller than normal droplets and land on the substrate in random positions



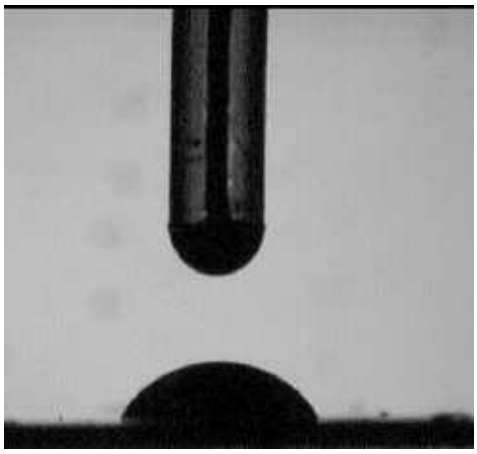
If a satellite lands close to the main droplet, the 'dot' on the media can look comet-shaped, increasing image quality problems

Surface tension is also a major factor on the media itself. After an ink drop has impacted on the media and before it is exposed to UV light, there is a period of time where the droplet is mobile and starts to spread. If the ink has a surface tension which is too close to, or higher than, the surface energy of the media, the ink will not flow to form repeatable circular dots. This can lead to an apparent change in the dot size with all of the accompanying effects on print quality such as shade and colour variation and resolution consistency. Sharp edges can be lost too. These are effects taking place at the interface between the ink and the media.

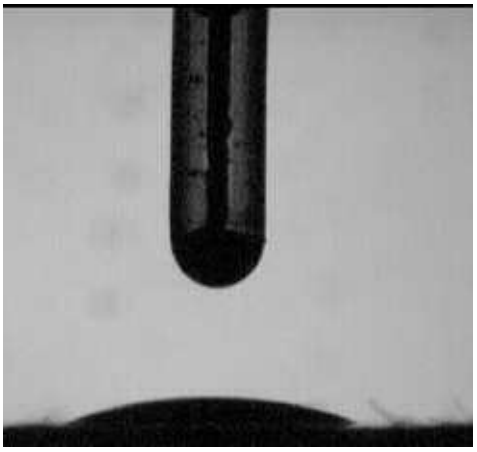
The previous two effects change the observed behaviour of the drops and their visible shape and size. Surface tension is also important in the wetting of the media and of the surfaces within the print head and other components in the printer. If the ink does not 'wet' or flow over the contact surfaces well, general movement of the ink will be hampered and again drop formation will become inconsistent. The ink must wet the inside surfaces of the nozzle channel and print head face plate. The ink maker takes care to ensure that each ink colour has the same surface tension characteristics to develop the same drop size for all colours.

On the media, if wetting is poor, we have heard that variable flow of droplets can create variable dot sizes. A secondary effect is that poor wetting leads to poor adhesion. If ink 'pools' or reticulates on the media, less of the ink is in contact during curing, which means less of the ink can bond with the media. An example of this is in the use of polyethylene or polypropylene media. If untreated, these media types have low surface energy, ink does not flow correctly and poor adhesion is typical.

With some surface treatment (corona, flame or plasma), the surface energy is raised and adhesion and print quality is greatly enhanced. The change in surface energy may be from the low 20s dynes/cm^2 to 40+ dynes/cm^2. Inks tend to have a surface tension of around 30 dynes/cm^2, so the change in the media from a surface energy below the ink to higher than the ink is significant.



Media surface energy < ink surface tension



Media surface energy > ink surface tension

continued over

Surface tension and, to some extent, viscosity also influence the shape of the ink meniscus at the nozzle. Although this can be controlled by use of the meniscus vacuum, the ink's physical properties can determine the vacuum level employed and, if the vacuum is constant, changes in the physical properties of the ink will lead to different meniscus shapes and positions which could result in changes to the drop shape and break-up point.

DENSITY AND PIGMENT / SOLIDS LEVEL

The density of UV curing inks is usually slightly higher than the density of water, so 1 millilitre of ink has a mass of more than 1 gm. The density of an ink has a bearing on the way the pressure wave created from the actuation of the piezo crystal travels through the ink, and thus the way in which a droplet is formed. Inks with very different densities will jet different drop sizes under the same jetting conditions. This is important when considering colour strength reproduction from files and also when matching inks in a set – it is uncommon for printer manufacturers to vary the jetting conditions in a printer to suit each of the CMYK inks individually.

Factors which change the density of an ink may also impact on other physical properties; for instance if you want to increase the colour strength of an ink, one could add more pigment to the formulation, which will increase the density of the ink, but this will also reach a maximum level where viscosity begins to increase at the same time. Most inks are a balance between colour strength and pigment content with viscosity and density.

Inkjet inks usually have a considerably lower level of pigment than inks for other printing technologies. This is why it is important that printing devices have very accurate control over drop placement on the substrate so that the colour present in the ink is maximised when building an image with several passes of the print head carriage.

PULSE EFFECTS / WAVEFORM

Drop velocity and drop mass are properties of the ink that can be altered not only by careful formulation, but also by control over the set points in the printer itself. For this reason it is important that the ink chemist and the printer design engineers work together to understand the properties that each can control.

We know that the printer maker can control printing temperature and therefore viscosity, but they can also change the electrical pulse applied to the piezo in the print head. The size of the voltage can be varied to increase drop size and the pulse shape can influence the break-up of the droplets and their shape, and the formation of satellites can be modified by controlling the rate of increase to the voltage (rise time), the length of the pulse (width) and its fall back to rest.

Although there are electronic and mechanical modifications that can be made to help droplet control, if the ink is not correctly formulated, the result is often a compromise in print quality or printing speed, since modifying pulse parameters can result in a reduction in firing frequency. Whilst controlling drop mass by electronic methods, it should be considered that drop velocity is also simultaneously changed; the speed at which a droplet is ejected and travels to the image will change its final position on the substrate. Software can be used to compensate for such changes but these are complications that can make the whole printing process more laborious.

DEGASSING

UV inkjet inks, like their solvent- and water-based counterparts, tend to have a 'baseline' level of dissolved air. The level depends on the ink constituents, viscosity and ambient temperature. As a particular example, ink chemists utilise surface active agents (surfactants) to control the surface tension and assist the dispersion of pigments and other components. Some of these materials can have properties which produce foams or can entrap air.

Ink that is not degassed or that has a tendency to trap gasses tends not to respond to the pulse from the piezo in a uniform manner. This can lead to incorrect size droplets, misdirected drops and 'spluttering', where droplets and satellite ejection from the nozzle are confused and uncontrolled – the resulting print defects are easy to imagine!

Dissolved gasses can also greatly affect the jetting sustainability; if dissolved air accumulates in the print head behind the nozzle, a void may be created which can de-prime the nozzle itself. In some cases this will lead to jet-outs which recover and drop out periodically, affecting print quality, or result in jet-outs which require intervention such as purging, which can lead to delays in job completion and unnecessary waste of ink.

It can therefore be helpful to have a degassing facility on the printer itself. These degassing components remove dissolved gasses by setting up a differential pressure (vacuum) on the non-ink side of a membrane. The dissolved gas in the ink can migrate across or pass through the membrane where the liquid ink cannot, so the ink becomes 'degassed'.

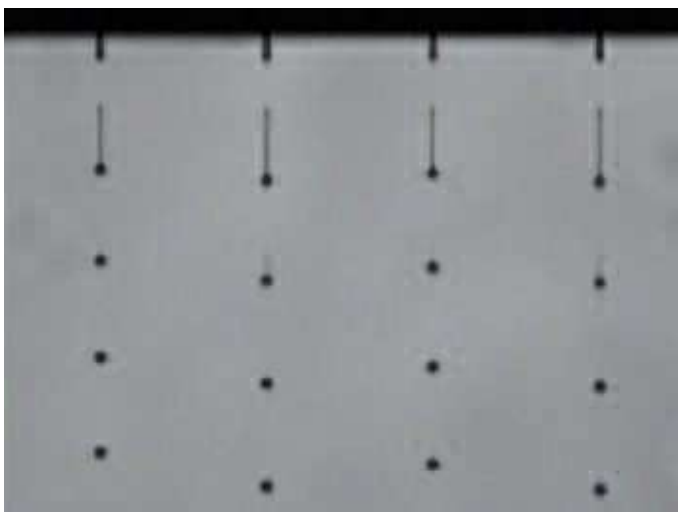
If inks are formulated with the printer designers, inks can be developed which reduce dissolved gas and respond to simple degassing strategies.

SUMMARY

Ink physical properties are affected by formulation and chemistry. Correctly formulated inks have more tightly controlled physical properties which overcome many of the difficulties involved in the jetting of inks. Interaction of the inks with the print head and components is important. Electronics in the printer and print head can be used to optimise jetting performance. The partnership between the ink maker, print head manufacturer and printer designer is essential. sp

This article was first published in the Durst Process newsletter

Peter Saunders is Sales & Marketing Manager of SunJet, a division of Sun Chemical



Ink exiting the nozzle array of a piezo print head

Further information:

Sun Chemical Limited, Bath, UK
tel: +44 1761 414 471
fax: +44 1761 416 609
email: peter.saunders@sunchemical.com
web: www.sunjetink.com

Durst Phototechnik AG, Brixen (BZ), Italy
tel: +39 0472 81 01 11
fax: +39 0472 83 09 80
email: info@durstonline.com
web: www.durstonline.com

PRINTING ONTO CHAMPAGNE BUCKETS

Harald Gavin describes how using servo driven screen printing machines can enable designers to print onto any shape or form

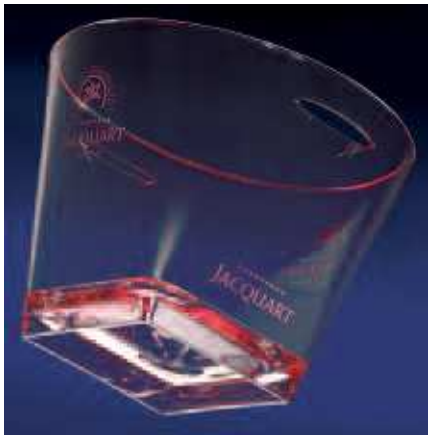


Figure 1: a champagne bucket

A STYLISH CHAMPAGNE BUCKET CONJURES UP VISIONS OF TIME SPENT IN ROMANTIC COMPANY – BUT A CHAMPAGNE BUCKET SHOULD ALSO CONVEY THE QUALITY OF THE CHAMPAGNE, AND DISPLAYING ON THE ICE BUCKET THE NAME AND LOGO OF A SUPERB BUBBLY IS AN IMPRESSIVE WAY OF DOING THIS.

Printing onto stylish champagne buckets can cause problems for screen printers as thick layers of inks have to be printed and the contours of the buckets can make it difficult to maintain constant squeegee pressure during printing. Examples of this are when a round bucket tapers seamlessly to a square base (see figure 1) or when the bucket has a contour of three intersecting circles (see figure 2).

USING SERVO DRIVES

High-precision servo-driven positioning control offers a solution to these problems. Servo drives can free screen printing machine designers from the restriction imposed by mechanical gear ratios. A contour detection station can be integrated into the screen printing machine and the control system of the machine can use the dimensional data of a contour for calculating the synchronised movements of squeegee and fixture during printing.

A single colour machine (see figure 3) can be used for multi-colour printing provided a precisely repeatable positioning of the buckets can be ensured by cleverly designed fixtures (see figure 4). Only then, with highly accurate item orientation, can a tight colour to colour registration be achieved; item orientation can be accurate to within ±0.1 mm.

Figure 4: a special fixture adapted to the shape of a bucket ensures repeatable hold

Figure 2: a stylish ice bucket in the loading station

NO END FOR SCREEN PRINTERS

Comprehensive job storage enables a screen printer to quickly set-up a servo-based screen printing machine for a repeat job, but this does not mean the skilled screen printer can be made redundant. It still requires screen printing experience to decorate stylish ice buckets that have the capacity to hold large quantities of ice and still have enough space for wine or champagne bottles. sp

Harald Gavin is Director International Sales & Marketing for Isimat

Figure 3: the EC 1480 is a single colour screen printing machine for printing onto ice buckets, champagne glasses and perfume flacons

Further information:
Isimat GmbH Siebdruckmaschinen, Ellwangen, Germany
tel: +49 7961 88625
fax: +49 7961 88644
email: info@isimat.de
web: www.isimat.de

HEALTH & SAFETY INFORMATION

SCREEN CHEMICALS FACT SHEET

CORROSIVE ALKALIS

WHERE USED	Used in screen cleaning chemicals such as haze removers. Removing ghost images from screen mesh after stencil and ink removal	
HAZARDS	Corrosive to human tissue Causes severe burns and serious internal damage if swallowed Can cause permanent eye injury Can react violently with acidic chemicals Can react with metals	
PROTECTION	Protective face shield Rubber/plastic apron or overalls Rubber or PVC gauntlets Rubber Boots	
FIRST AID	Skin	Immediately wash thoroughly with water and get medical attention. Cover wound with sterile dressing. Failure to treat burn may prevent healing.
	Eyes	Irrigate with clean water for 15 minutes ensuring eyelid is held away from eye and get urgent medical attention.
	Ingestion	Wash out mouth thoroughly, drink water to dilute and get urgent medical attention. Provide fresh air
	Inhalation	Immediately supply fresh air

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HEALTH & SAFETY INFORMATION

SCREEN CHEMICALS FACT SHEET

CHLORINATED SOLVENTS
(Typically methylene chloride)

WHERE USED	In flash dry screen fillers and rapid dry mesh adhesives to facilitate quick drying on application.	
HAZARDS	Harmful by inhalation and skin adsorption Limited evidence of a carcinogenic effect Inhaling fumes may cause drowsiness (narcotic effect) Regular skin contact may cause dermatitis Very irritating in eyes Ingestion may cause liver/kidney damage	
PROTECTION	Protective face shield/goggles Good permanent ventilation is essential, exhausting fumes away from operator with a fresh air supply Rubber/plastic apron or overalls Protective Gloves (PVA type)	
FIRST AID	**Skin**	Immediately wash thoroughly with water and get medical attention
	Eyes	Irrigate with clean water for 15 minutes and get urgent medical attention
	Ingestion	Wash out mouth thoroughly, drink water to dilute and get urgent medical attention
	Inhalation	Move to fresh air. Perform artificial respiration if breathing has stopped. Get urgent medical attention.

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HEALTH & SAFETY INFORMATION

SCREEN CHEMICALS FACT SHEET

OXIDISERS
(Note : Different types of oxidisers are used for different applications)

WHERE USED	In gelatine film photostencil hardeners, stencil Decoaters to remove PVA based stencils and to act as a catalyst in hardening screen adhesives.	
HAZARDS	Different Oxidisers may react vigorously with each other. Store well separated. Do not rebottle used solutions (oxygen evolution causes pressure). Corrosive to human tissue Causes severe burns and serious internal damage if swallowed. Can cause permanent eye injury Can react violently with other chemicals Contact with combustible materials may cause or enhance fire.	
PROTECTION	Protective glasses or goggles Rubber/plastic apron or overalls. Rubber gloves If dusty powder, wear respirator (dust mask) Maintain good ventilation	
FIRST AID	**Skin**	Immediately wash thoroughly with water and get medical attention
	Eyes	Irrigate with clean water for 15 minutes and get urgent medical attention
	Ingestion	Wash out mouth thoroughly, drink water to dilute. Get urgent medical attention
	Inhalation	Remove to fresh air. Get medical attention

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HEALTH & SAFETY INFORMATION

SCREEN CHEMICALS FACT SHEET

DIAZO SENSITISERS
(Note : Diazo chemicals may be liquids or powders)

WHERE USED	These chemicals make photostencil emulsions sensitive to Ultra Violet light causing the coating to harden (become insoluble) in exposed areas.	
HAZARDS	Liquids may be corrosive to human tissue Liquids may cause burns and internal damage if swallowed Powders are harmful if swallowed Liquids and powders are irritating in eyes Powders may be flammable solids or aid combustion Liquids may react with other chemicals	
PROTECTION	Protective face shield/goggles (liquids) glasses (powders) Rubber/plastic apron or overalls. Rubber gloves Powders may be dusty – use respiratory protection (dust mask) and good ventilation	
FIRST AID	**Skin**	Immediately wash thoroughly with water and get medical attention
	Eyes	Irrigate with clean water for 15 minutes and get urgent medical attention
	Ingestion	Wash out mouth thoroughly, drink water to dilute. Get urgent medical attention
	Inhalation	Remove to fresh air. Get medical attention.

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A further 8 screen chemicals fact sheets will be published in the next two issues of this magazine, or go to www.specialistprinting.com to print out at full size.

PRINTING IN PERFECT REGISTRATION

Steven Abbott demonstrates that high tech screen printing is a real possibility, despite registration problems

WHEN PEOPLE TALK ABOUT THE NEXT GENERATION OF FLEXIBLE ELECTRONIC DEVICES SUCH AS DISPLAYS, THERE IS OFTEN AN ASSUMPTION THAT THESE ARE 'SIMPLY' GOING TO BE PRINTED WITH INKJET MACHINES. IF YOU'VE EVER TRIED TO USE AN INKJET MACHINE FOR PRECISION PRINTING (AND I HAVE), YOU WILL KNOW HOW FAR THIS DREAM IS FROM REALITY. IF YOU CHALLENGE PEOPLE ON THIS THEY ACKNOWLEDGE THE PROBLEMS.

If you then say that they should screen print, their first reaction is to laugh at the proposal – they think that screen printing is for low tech, not for high tech. If, finally, you convince them to consider screen printing (pointing out the problems with inkjet, offset, flexo and gravure), they come up with a very strong reason why screen will be no good. The reason is the problem of registration. Although I'm very optimistic about high-tech screen printing, I have to admit that the registration problem is very, very tough and that in this area the inkjet folk have a powerful advantage.

AN EXAMPLE

Let me give a specific example so you can see the scale of the problem. Let's try to screen print a flat-panel display using state-of-the-art plastic transistors and polymer light emitting diodes (PLEDs). Let's assume that the screen printing of each component is not a big problem in itself. With modern stainless meshes, the latest low-EOM, low-Rz stencils and with inks optimised to reduce 'slump', we can produce high quality fine-line work down below 50 µm. I'm not claiming that any of this would be easy, but I just want to take this part of the process for granted and concentrate on the real problem of registration.

To simplify even further, let's just concentrate on two elements of the display and assume (wrongly!) that we can print a transistor in one pass and the PLED in the second pass. In other words, we need to register 1 million PLED printed dots on top of 1 million transistor dots.

Assuming a display that's 300 x 300 mm with 1000 x 1000 resolution, each pixel occupies 300 µm square. Let's say that the PLED element must be 250 µm square, leaving a 25 µm border around each pixel. If our transistor dot is smaller – say 160 µm square – then in perfect registration we have a border of 45 µm around the transistor. To make sure that our PLED always fully covers the transistor, we have to make sure that we are accurate to 45 µm over the whole 300 x 300 mm.

Figure 1 illustrates this idea. The dots on the left are all perfectly arranged with the 45 µm border. By the time we reach the other end of the image, some of the dots are just about OK, but one of them has gone over the 45 µm limit.

PRESERVING ACCURACIES

The industry requires accuracies greater than this. For example, a typical 'pixel' might be 200 µm square but is made of the three colours, RGB, so each becomes a rectangle 200 x 60 µm, which leaves only a 10 µm border between pixels. But we'll use the 'easy' target of 45 µm for the rest of this discussion.

We can readily find single effects that will give us an error of 45 µm over 300 mm, so the challenge of preserving this accuracy with multiple effects is severe. Here are the first two effects:

- Suppose our mesh is perfectly stretched and everything is in good registration. Let the screen relax a bit, by a tiny 0.015% (this means, for example, a tension going from 25N to 24.996N!). Over 300 mm this is 45 µm.
- Or let's suppose that we use a large 5 mm snap-off. Over the 300 mm horizontal distance the image becomes ~45 µm longer. With extra distortion because of squeegee pressure and drag of the mesh coming out of the ink (especially if the ink is too viscous), this will get significantly longer.

Even if the press itself is perfect, this is still a challenge. We can easily identify three more issues:

- Suppose we are using a polyester substrate. It expands by 15 µm across 1 m for every 1°C of temperature rise. If the temperature changes by 10°C it will expand by 15*0.3*10 = 45 µm.
- Another effect, Relative Humidity (RH), comes into play. Polyester also expands by 15 µm/m/%RH. So a 10% change in RH also changes dimensions by 45 µm.

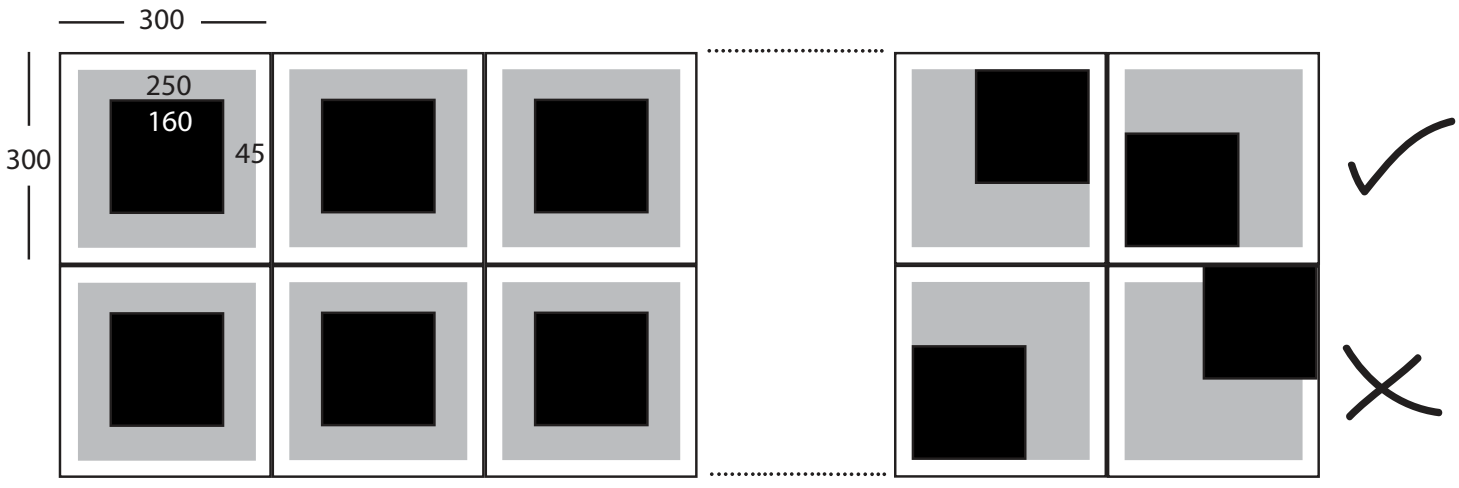


Figure 1: One of the dots has gone over the 45 µm limit

- If we are printing roll-to-roll then we might want to keep our polyester under tension. If it's 100 µm thick then a typical tension of 60 N/m will stretch it by 45 µm over 300 mm.

CALCULATING EFFECTS

These last effects are not so familiar to many printers. If you want to try calculating them for your own system, the equations for temperature or humidity expansion are the same, with 'Change' either being ºC or %RH:

Expansion = Expansion-Coefficient * Change * Length

You will find large variations in expansion coefficients. For example, PET (polyester) expands by 15 µm/m/ºC, PC (polycarbonate) expands by 30 µm/m/ºC and PP (polypropylene) by as much as 100 µm/m/ºC. Similarly, PET expands by 15 µm/m/%RH, the poly-olefins by ~1 µm/m/%RH and PMMA (Polymethyl methacrylate), which absorbs a lot of water, expands by a frightening 100 µm/m/%RH.

A good approximate formula for the stretch of a substrate under tension is:

Stretch = Length * Tension / (Modulus * Thickness)

To check out the calculation for PET you need to make sure that everything is in the correct units, so put in 0.3 for Length, 60 for Tension, 4,000,000,000 (4GPa) for the Modulus and 0.0001 for the Thickness. The result, 0.000045, translates to 45 µm.

SCREEN ISSUES

This list of problems (and it's not exhaustive) means that we have to approach the task systematically. Unless we have good temperature, humidity and tension control we can't even begin to tackle the problem. But assuming that all non-screen factors are under control, how do we take care of the screen issues?

We need to know what we're doing when we stretch our screens – do it badly and the tensions will sag both in storage and during printing. There has been a revolution in understanding how to stretch properly and modern equipment does a far better job.

But however good the mesh is, we can harm it by stressing it too much so we have to get into good habits right from the start:

- We need to use a mesh which retains its shape. Polyester is simply not up to the job for this high degree of accuracy. Stainless is, of course, very good. The newer liquid crystal meshes are also remarkably stable.
- We need to print with essentially zero snap-off so that there is no need to deform the mesh during the squeegee stroke. The only way we can do this is to minimise the drag on the mesh as it comes out of the ink. A fine stainless mesh will experience less drag than a coarse polyester mesh. Unfortunately, the liquid crystal meshes gain strength in the length-wise direction by sacrificing strength in the cross-thread direction, so they tend to be a bit fat and might cause a lot of drag. But ultimately it's down to the ink. It should be strongly shear thinning so that, at the shear rates of the mesh coming out of the ink, the drag is minimised.
- We need to use the minimum squeegee pressure so there is the minimum drag in the direction of the squeegee stroke. Again this means a good shear-thinning ink. It also means the thinnest possible stencil (provided it is low-Rz) so there is the minimum work required to get the ink through to the substrate. An alternative is to get rid of the squeegee altogether and use a pressurised ink delivery system, but this is more speculative.
- We should avoid applying the stress in only one direction, so we need a squeegee/flood system that can print in both directions. This is unusual for classic screen printing but is now quite common in high-tech printing.
- We need to rely on feedback control. With automatic registration systems it's possible to apply controlled tension to the screen frame itself to compensate for length changes from, for example, relaxation of the mesh tension.

Such systems will not be cheap, but we're talking about the high-end here – and what's the alternative? If you are using inkjet you have the advantage that you can (in theory at least) place your drops exactly in registration. But this too needs accurate automatic registration systems with feedback to the inkjet positioning systems. This isn't cheap either.

OPTIMISING ELEMENTS

By understanding the individual elements that affect registration, by optimising those elements that are relatively simple to control (shear-thinning ink, thin mesh fibre, low-EOM, low-Rz stencil, near-zero snap-off, alternating squeegee strokes, temperature and humidity control, substrate tension control), then the process is already off to a good start.

Although I'm a great optimist about the future of technical screen printing, I'm not suggesting that we should rush out and start printing PLED displays tomorrow. Instead, the message is that we should start putting these principles into practice with less challenging jobs, so we can earn the respect (and the business) from those who want to make flexible electronic devices as they start transitioning from promise to large-scale reality.

Professor Steven Abbott is research and technical director for MacDermid Autotype

Further information:

MacDermid Autotype, Wantage, UK
tel: +44 1235 771111
fax: +44 1235 771196
email: info@autotype.com
web: www.macdermidautotype.com

INKJET – PAST, PRESENT AND FUTURE

Mark Alexander looks at the advances inkjet printing has made and predicts its bright future

INKJET HAS NOW FIRMLY ESTABLISHED ITSELF AS A VIABLE, FLEXIBLE DIGITAL PRINT TECHNOLOGY IN KEY NICHE MARKETS, PARTICULARLY IN OUTDOOR SIGNAGE WHERE SCREEN PRINTING HAS TRADITIONALLY DOMINATED. IT HAS ACHIEVED MAINSTREAM ADOPTION AND RECOGNITION IN WIDE AND GRAND FORMAT PRINTING, AND IN CODING AND MARKING, BUT NOT YET IN THE BROADER COMMERCIAL PRINT MARKETS DOMINATED BY OFFSET LITHO, FLEXOGRAPHY OR, FOR VARIABLE DATA, THE ELECTROPHOTOGRAPHIC DIGITAL PROCESSES.

A SERIOUS THREAT?

Can inkjet technology become a serious threat to offset and further displace traditional screen and other printing processes? In my opinion the answer to this question is yes, but it won't happen overnight. As a printing process, inkjet is still maturing and has a great deal of scope for future development, unlike offset or flexo where future improvements are likely to be incremental.

Today there are three main inkjet technologies:

- Continuous inkjet is the dominant process in coding and marking and transaction billing.
- The Drop-on-Demand (DoD) thermal / Bubblejet inkjet technology dominates the office and domestic market for office and low-volume photographic printers.
- Piezoelectric DoD inkjets were invented after thermal.

Piezo inkjet competes with thermal / Bubblejet on the desktop and in aqueous wide format printers, where piezo-based Epson and its OEMs compete with thermal HPs and Bubblejet Canons. However at the industrial scale, where a wide range of inks are available, piezo inkjet dominates and most systems use printheads developed by Xaar, Fuji-Spectra or Epson and their various OEMs.

Digital printing is already in the commercial printing industry in the form of the electrophotographic processes used by, for example, Xerox with its DocuColors, Canon with its CLCs and Xeikon with its reel-fed single-pass duplex printers. These printers are occupying niches where their short-run, fast-turnaround and/or variable data abilities are unique, but they can't compete with offset's economy of scale for runs above a few hundred or at best a few thousand copies. They certainly can't match the abilities of flexo or screen process to print economically on a huge range of substrate materials and weights, and struggle to even approach conventional offset in this regard.

The 1001 print head

REVOLUTIONARY IMPACT

For digital imaging to revolutionise the industrial print segment it needs to offer flexibility in more than just image reproduction. Inkjet can print more fluids onto a greater range of substrates than other conventional or digital processes, but the fundamental limitation is that while it's relatively easy to achieve high speed or high throughput, as soon as you try to get both in the same printer then the costs escalate.

Primary packaging and direct product printing are key adopters of the technology today and for the foreseeable future, with many new applications poised to mirror these trends towards the end of this decade.

There is a range of machines that exists today, from wide and grand format machines and coding and marking machines to newer, industrial strength print machines such as the Agfa M-Press (for screen printers) and PAT's Varstar (inkjet UV coater/finisher) as well as the Copytrax CD printer. All deliver value and differentiation in flexibility and productivity from traditional processes whilst matching, and sometimes exceeding, current print quality.

KEY ASPECTS

Here are four key aspects that are needed by an industrial strength inkjet:

1. Long life: high resolution requires a high number of actuations or drops fired, whether small drop binary or greyscale. It also requires shear mode actuation for longevity.
2. High native resolution (for single-pass): this demands a high nozzle count (i.e. nozzles per inch) which is enabled by shared wall technology.
3. High print quality: fine detail through to full coverage, which requires variable-sized droplets (greyscale).
4. Reliability: this includes sustainability and self-recovery and requires an acoustic firing mode.

The first two elements have been

The Xaar 760 printhead

available for a long time within Xaar's piezoelectric drop-on-demand technology. The combination of shear mode and shared wall technologies has allowed Xaar and its licensees to produce heads that deliver industrial-strength life. The key active part within a piezo printhead is the actuator and this is operated beyond 10 million million (10 to the power of 12) actuations without failure. Duty cycles within normal print are around 20%, so this typically means over four years of life.

BREAKING BARRIERS

XaarDOT is the ability to control variable-sized drops and fine-tune them to the application (DOT is 'Drop Optimisation Technology'). Xaar's greyscale printheads can generate up to 15 different drop sizes by combining multiple small sub-droplets (e.g. 6 picolitre), fired in quick succession, onto the same printed dot. This allows the 360 dpi actual resolution to give results equivalent to 1,000 dpi but with far fewer nozzles, which gives results that more closely match the performance of the human eye.

XaarDOT gives the customer the choice of what drop size or resolution to use for the job in terms of image quality and substrate flexibility. By tuning the options, printer manufacturers can produce anything between high quality photographic results for close-up indoor viewing, and high productivity larger droplets for outdoor viewing on billboards or other signage. The range of drop sizes means dot gain can be compensated for, enabling printing on a wide variety of media, from glossy paper to absorbent materials such as textiles.

THROUGH-FLOW TECHNOLOGY

Through-flow (TF) technology helps run inkjet systems reliably for a full shift with minimal maintenance. This may lead to reliable fixed arrays, built to the full width of the printing area that can run very fast (thousands of square metres per hour). These could also be suitable for wide format printers as well as narrow format transaction printers because they would not need multi-pass printing to compensate for missing jets.

Xaar's new Hybrid Side Shooter (HSS) head technology allows this TF operation. An acoustic wave is triggered which fires the drop out of the nozzle at the end, however nozzles can fail, either by particulate blocking or because air bubbles form. A failure then requires a wipe/purge maintenance routine to re-prime the nozzles.

In the latest HSS approach the ink flows past the back of the nozzle. Two acoustic waves moving through the channel meet in the middle and cause pressure changes which fire a drop out of the side of the channel. Air or particles are moved away from the nozzles, keeping the channel primed and operational. Any nozzles that are lost due to a knock will quickly self-recover.

The Xaar premises in Cambridge, UK

The first model to reach OEMs is the Xaar 1001 head and printers such as the Nilpeter Caslon are already being commercialised.

THE LONG VIEW

How far will inkjet go in future? Applications for page-wide HSS arrays could include imprinters that can keep up with high speed web offset, flexo or gravure print lines, with higher quality than today's systems, or complete digital colour presses.

HSS can also jet what were previously regarded as unstable suspensions and metallics, where normally the particles would settle out and block the nozzle. Moving from inkjet to 'X-jet,' where X is any fluid, not just ink: in nearly all cases the X-fluid is not an ink but either a conductive metallised fluid, a polymer or even a human skin cell.

In commercial print HSS is suitable for white and other high-pigment UV-cured inks, or decorative packaging applications such as metallics. Industrial applications could include silver conductive tracks for printed circuit boards such as RFID antennas, plus emerging technologies such as PLED flexible display screens, flexible circuit boards, smart packaging and labels, 3D objects and even medical applications such as skin grafts and, eventually, replacement organs. In conclusion, there is likely to be an inkjet solution to fit many applications, either today or in the future.

Mark Alexander is Director of Marketing at Xaar

Further information:
Xaar, Cambridge, UK
tel: +44 1223 423663
fax: +44 1223 423590
email: info@xaar.com
web: www.xaar.co.uk

FUJIFILM Sericol acquisition targets wide format market

FUJIFILM Sericol has acquired the business of Colormy in a move to spearhead its growth in the European wide format inkjet market. The company, based in Cologne (Germany), sells wide format printers, ink and media under the euromedia brand. The acquisition will give FUJIFILM Sericol access to a wider base of digital graphics producers who do not screen print, as well as provide specialist commercial and technical skills specifically designed for wide format producers.

"Colormy is a successful business with a highly developed system-sales approach," said Peter Kenehan, FUJIFILM Sericol's European Director. "We intend to build on this winning formula to strengthen our position in wide format."

New digital offset printing product line

Avery Dennison's Graphics & Reflective Products Division has launched a new Fasson Digital Offset product line for digital offset printing. The new line was developed with the HP Indigo Group and can be used in a variety of applications such as multi-colour quality labels, promotional and collectable stickers.

The new line can be used for applications such as multi-colour quality labels, promotional and collectable stickers

It includes three white papers (available with matte, semi-gloss and cast coated high gloss face finishes) and four film products which are environmentally friendly and offered in a matte finish polyethylene, a clear polyester and a clear or white gloss polypropylene. The products can be used in a variety of small run, hand-applied applications such as CD or mailing labels and flexible packaging. The new product line can be used with the HP Indigo, Xerox DocuColor and iGen3 and Kodak NEXPRESS digital presses, offering full bleed printing on a global sheet size (12.59 x 18.11 inches or 32 x 46 cm).

The Division has also launched a new marketing initiative to highlight Fasson Crack'n Peel products, which are used in applications such as speciality premium, prototype and short-run labels, children's stickers and backstage concert passes. The product line includes premium white facestocks, premium colours, block-outs that offer 100% opacity and speciality sheets including a satin cloth.

The products feature a hot melt, rubber-based adhesive that doesn't ooze when running through the press or when it is die cut / guillotined, and a diagonal score pattern that provides up to 25% better yield when printing multiple labels per sheet. The score also allows labels to be nested in any pattern without risk of die-cutting or guillotining along a vertical score line.

UV LED curing unit debuts at SGIA 2007

Summit UV, developer of LED curing systems for printing, imaging and dispensing applications, demonstrated its Black Diamond 365 Series UV LED curing units at the SGIA 2007 show on a wide format graphics inkjet printer. It produced high resolution images at production speeds and used standard off-the-shelf UV curable inks.

The Black Diamond 365 Series has a shorter single-peak 365 nm UV-light wavelength and higher output compared to conventional high intensity LED lights in an air-cooled only lighthead for units delivering up to 4.0W/cm^2 peak irradiance. Operating at the 365 nm wavelength means more available chemistry options. The higher power output produced is easily measurable using standard off-the-shelf radiometers, and the multi-faced array requires significantly fewer LED packages for more efficient product configurations.

Digital printing company invests in screen printing

A new product has been launched for the screen print market that can read screen stencils. The ScreenReader is a versatile DotMeter that can also read film and litho plates, and was developed in the UK by Laurie Mullaney Associates and Ripware.

The Data Image Group from the UK recently invested in a screen printing line with auxiliary equipment, where it was faced with the problem of the creation of accurate screen stencils. "This aspect of quality control did concern us," commented Alan Farfort, Director of the company, "but with the help of our ScreenReader the mystery of dot / stencil integrity is now predictable and using good quality meshes with quality coatings and using colour balanced inks, the final result is now controllable and predictable."

The ScreenReader

The ScreenReader was exhibited on the KIWO stand at the SGIA show, where it attracted much favourable attention.

Marabu acquires ink supplier

Marabu has acquired the assets of Clearstar Coatings, a manufacturer of liquid laminates and inks for digital printing based in the USA. Stephen Berman, Clearstar's founder and President, becomes General Manager. "Having Stephen Berman on board means having one of the most knowledgeable persons in the sign industry on our team," commented Dr Roland Staehlin, Marabu's Head of Printing Ink Division – Marketing and Sales. Clearstar's liquid laminates and digital printing inks add an important product portfolio for Marabu, giving the company a manufacturing facility in the American market.

Roland Staehlin

EFI invests in UV wide format printing company

EFI has completed its strategic investment in Raster Printers, a company based in California that offers a line of environmentally-friendly UV wide format printers marketed under the brand name Daytona.

"Raster Printers has developed market-leading products in wide format UV inkjet printing," commented Chet Pribonic, SVP & GM of EFI VUTEk. "Raster's products offer an ease-of-entry strategy for printers wishing to take advantage of the huge market opportunity offered by roll-to-roll and rigid substrate UV printing of display graphics."

"Collaboration with EFI will help us deliver the quality and reliability that our customers expect, and enable us to increase the level of innovation we can jointly introduce into the UV wide format market," added Rak Kumar, President of Raster Printers.

Sales appointment at screen print supplier

International Coatings has announced the appointment of Kieth Stevens as Western Regional Sales Manager in the USA, where his main focus will be on print and industrial product sales. He has over 29 years of experience in sales and in the screen printing industry, with extensive knowledge of all types of screen printing for both textiles and graphics, including ink types, ink additives and their usage.

Kieth Stevens

New transport magazine on market

Harlacher has introduced its new H14 Transport Magazine for the screenprinting pre-press sector to connect different processes for a higher degree of automation. The H14 can communicate with coating machines, washing machines, developing units and other units from other manufacturers. The transport magazine can be used in a first in first out in-line system or a specific in and outlet magazine in a C, Z or I configuration.

The new H14 Transport Magazine

Blue laser direct exposure system launched

Swiss company Lüscher has reported strong interest for its newly launched JetScreen DX flat blue laser direct exposure CtS (Computer to Screen) system at FESPA Berlin in June 2007. The system uses long-lasting and high-powered blue laser diodes which, with the elimination of other consumables, significantly reduces recurring stencil production costs in fabric and screen printing. Direct laser exposure improves stencil quality in terms of its edge definition, printable image resolution and mechanical and chemical resistance during the print run.

Lüscher's Laser JetScreen DX

There is a choice of exposure resolutions (600, 900 or 1200 true dpi) and laser diodes (32, 64, 96 or 128). Virtually all normally sensitised production materials can be completely hardened and cured from the print to the squeegee side at maximum exposure speed with no loss of quality. The system is compatible with white, yellow or stainless steel meshes and the resulting stencil has a high level of resistance to mechanical abrasion, water and solvents. The Lüscher Laser JetScreen DX is produced for all current external screen frame formats from 1800 x 1600 mm up to 3800 x 8000 mm.

Corner lock system for screen printing frames

The Hurtz Corner Lock System (HCL) is a corner connection for screen printing frames. The customer builds the frame up on location by connecting the individual parts to the corners and fixing them with two taper pins specially designed for optimum load transmission, thus saving on transport costs.

The new corner connection withstands great forces and strengthens the entire frame, but is neither heavier nor thicker than traditional frames. It can be used for large frames up to 4 x 8 metres, and is offered with professional profiles, standard profiles and also 16 special slope profiles.

Some ESMA members who attended Grünig's 40-year celebration included (from left to right): Thomas Schweizer (Lüscher), Michael Mogge (Sign-Tronic), Deniz Celebiler (Printcolor), Henri Kunz (Fotec), Marcel Grünig (Grünig), Peter Buttiens (ESMA), Werner Deck (Remco), Andreas Ferndriger (Grünig) and Andreas Schneider (Sefar)

DOUBLE CELEBRATION FOR SWISS SCREEN PRINT SPECIALISTS

Andreas Ferndriger recounts the 40-year history of Grünig and outlines what gives the company a special quality

GRÜNIG IS A KEY SUPPLIER OF EQUIPMENT FOR THE SCREEN PRINTING PROCESS, MANUFACTURING A RANGE OF STENCIL PRODUCTION EQUIPMENT. IT HAS BEEN IN EXISTENCE FOR 40 YEARS.

COMPANY ORIGINS

Grünig started when Hans Ulrich Grünig, a machine and metalwork engineer, set up the company in his home town of Schwarzenburg, Switzerland, with the aim of automating and standardising the stencil-making process.

He started by manufacturing machinery for rotary and flat screens, mainly for the textile business, before the company expanded to produce more products for graphic applications. For the last 15 years it has moved into a wide variety of industrial applications such as glass, CDs, electronic instruments, ceramics and food labels.

Marcel Grünig has been the current owner since 1999 and Managing Director since 2002. He is joined by a number of people who have had a big influence on the company and its development over the years, such as Thomas Schweizer, who developed the international network of Grünig partners between 1992 and 1995.

Andreas Ferndriger was the company's first production manager and has been Sales & Marketing Director for the past 12 years, and Markus Rohrbach has been in charge of R&D for the last 20 years. The current Production Manager, Walter Zbinden, has been in the position for 12 years. However the prize for longest-serving employee goes to the Head Mechanic, Peter Mischler, who has been with Grünig for 25 years.

THE COMPANY

Since 1995 the turnover, the staff, the output and the range of equipment at the company has doubled. Today Grünig sells around 240 machines or projects to 40 different countries each year. Around 10% of Grünig's business comprises other equipment or engineering projects that are produced for third parties.

Staff are recruited locally from the Bern area, by recommendation from colleagues or via the internet. Staff development is important too, with further training and education supported by the company. In 1967 Grünig had only one employee; by 1992 this had risen to 16 employees and since 2002 it has had 40 employees. Its continual development is put down to innovation, a wide product range and more 'in-line' solutions, as well as flexibility and customer-orientated service.

During the last 30 years the company has seen great changes in the screen printing and decoration industry: companies have become bigger and increasingly global while higher quality, health and safety regulations have become more prevalent, flexibility and short delivery terms have become commonplace, and markets and products are now more transparent. In particular, images and other special effects have been added to a wide range of different materials.

Automation and standardisation have led to the development of in-line processes, where one supplier can provide all products for the screen making process. For instance, Grünig has developed the G-WASH 101 nozzle for every washing unit, the G-STRETCH 201 clamp for every stretching unit, and the G-COAT 401 coating trough for every coating unit – all of which the company claims are unique.

FINANCE AND PRODUCTS

Grünig's annual company turnover is around € 5-6 million, with its biggest sellers being the G-COAT 404 coating machine, the G-COAT 405-411 screen coating machine (Grünig developed and built the first screen coating machine for Harlacher Switzerland), the G-WASH 170 modular and in-line cleaning system, the G-WASH 12 compact unit for different cleaning jobs, and the G-STRETCH 215 pneumatic stretching table. The company's most successful product developments over the course of its history have been specific machine sizes for small, medium, large and xx-large screens.

One of Grünig's latest products, the G-COAT 404 US-Coater automatic coating machine, is designed for automatic screen coating up to a maximum frame format of 49 x 59 inches. It has been painted in the colours of the flag of the USA – a new 'stars and stripes' design to confer an emotional touch to the machine. Grünig's newest product line is the Plug & Coat/Wash/Strip for smaller quantities and budgets.

The best years for the company financially have been 2000, 2005 and 2006 (pending the financial results for last year). Its biggest and longest-standing customers are the Sefar group, and its key geographic markets are

Attendees are welcomed to Grünig's double celebration

Grünig's new manufacturing hall

Europe and the USA, with expansion predicted in new markets such as India, Australia, South Africa, Brazil and Mexico.

About 15% of the budget is spent on research and development, with the company currently focussed on increasing automation, forging long-term partnerships, standardising the screen production process and reducing costs per screen.

THE PRINTING INDUSTRY

Since the company began, it has seen more and more industrial applications, with print and screen quality becoming increasingly important. Screens have been developed in all sizes and Grünig has especially noticed a trend towards extra-large formats. Companies are becoming increasingly global and there are subsequent different levels in printing quality and screen printing standards and automation. This has led to more global contracts – Grünig sees India and Asia as being very important markets for the future.

Looking to the future, the company sees value in understanding customer needs and offering customised solutions for these specific needs. It believes that printing solutions offered from one source will help the customer to use screen printing technology in the most professional way.

Grünig believes that manufacturers and suppliers should be concentrating their strategies on developing the most flexible, high quality and unique decoration method, which is screen printing. Print quality is the most important aspect of the process, and the company stresses the need for standards, more automation and less cost per screen, as well as better concepts to handle big screens.

INDUSTRY ORGANISATIONS AND ASSOCIATIONS

Grünig acknowledges the importance of the two main trade associations – ESMA and FESPA – in the European screen printing industry. However the company believes that better communication is needed between all associations and organisations so they work together and not against each other, and their work as intermediaries should also be better, especially between suppliers and organisations.

Grünig sees many benefits to being an ESMA member, including having one European voice that represents all members to promote screen printing processes across an international network. It also sees the importance of organising seminars and exhibitions and having some influence on where exhibitions take place and how much they cost, as well as working on standards and new concepts, including environmental standards and needs.

The company sees a real benefit in forging an international network with an organisation that represents all its members and suppliers to bring different printing technologies together, as well as waving the flag for the screen printing industry in general. Bringing together different suppliers in the sector helps with the development of new processes and segments, and brings better and faster information on areas such as market trends, standards and activities.

A DOUBLE CELEBRATION

From 30 August to 1 September 2007, Grünig held a three-day ceremony to celebrate the company's 40 years of existence as well as the inauguration of its new 1400 m^2 manufacturing hall. Grünig traders were invited to an international meeting at Schwarzenburg, with 30 dealers from 20 nations attending. As well as being presented with the latest products, guests also enjoyed social activities, getting a closer view of the mountains and gaining some insight into Swiss traditions such as Alphorn players and yodellers.

Friday 31 August was the day of the manufacturing hall's official inauguration which took place in the presence of 200 guests, including suppliers, representatives of the local authorities, staff members and the international press. Hans-Ueli Grünig looked back over the past 40 years of company history and the current management team of Marcel Grünig and Andreas Ferndriger inaugurated the new building, followed by guided company tours and a social evening.

The following day the company opened its doors to the local population. Approximately 600 people took the opportunity to visit the company, asking questions about the various production processes and training possibilities for young people (Grünig-Interscreen offers apprenticeships for automation specialists and poly-technicians) as well as enjoying the free lunch.

The celebration enabled Grünig-Interscreen to simultaneously form cross-national social networks, sharpen international suppliers' understanding, consolidate its position as an attractive local employer and demonstrate the emphasis and importance of qualified professional training for adolescents.

Grünig is proud of its distribution partners and its highly motivated and flexible employees, and believes the key to a good customer relationship starts with trust, service and quality. And with the opening of a new production hall, the company's strategy seems to show that it is ready for the future.

Andreas Ferndriger is Sales & Marketing Director at Grünig

Andreas Ferndriger, Sales & Marketing Director

Further information:
Grünig Interscreen AG, Schwarzenburg, Switzerland
tel: +41 31 734 26 00
fax: +41 31 734 26 01
email: mail@grunig.ch
web: www.grunig.ch

SGIA HAS ITS BIGGEST EVENT

Over 20,000 people attended SGIA '07

THE SPECIALTY GRAPHIC IMAGING ASSOCIATION (SGIA), AN INTERNATIONAL ASSOCIATION FOR SPECIALITY IMAGING BASED IN THE USA, HELD ITS ANNUAL EXHIBITION IN FLORIDA IN OCTOBER LAST YEAR.

ATTENDANCE AND EXHIBITORS

Total attendance at the SGIA '07 expo, held in the Orange County Convention Center, was 20,782; visitors from the USA made up 83.3 per cent of this total, with the greatest number of attendees from outside the USA coming from Canada (19.4 per cent), Mexico (11.72 per cent) and Brazil (4.19 per cent).

There was a total of 586 exhibitors, and floor space totalled 243,500 square feet – a record in SGIA history.

THIS YEAR'S EVENT

SGIA '08 will be held from 15-18 October at the Georgia World Congress Center in Atlanta (GA), USA.

Chameleon Business Media, publisher of this magazine, is a proud member of SGIA.

Further information:
SGIA, Fairfax (VA), USA
tel: +1 703 385 1335
fax: +1 703 273 0456
email: sgia@sgia.org
web: www.sgia.org

www.americanultraviolet.com

www.ccidom.com

www.efi.com

www.averygraphics.com


www.clearstarcorp.com

www.encresdubuit.com

www.brother.com

www.durst-online.com

www.ergosoft.ch


www.cbm-ltd / www.specialistprinting.com

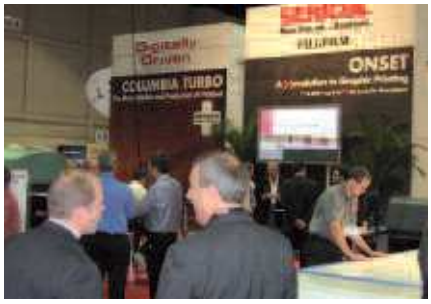
www.dynamesh.com

www.fespa.com

www.serilor.com

www.ifcfabrics.com


www.mrprint.com



www.sericol.com


www.icc-chemicals.com

www.macdermidautotype.com

www.gspinc

www.iccink.com

www.marabu-inks.com

www.grunig.ch


www.kammann.de

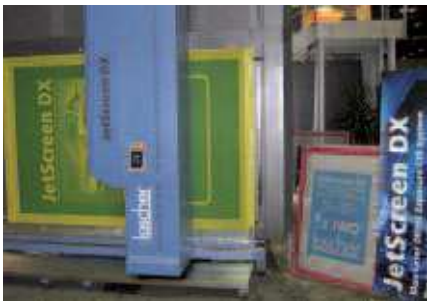
www.mhm.at

www.harlacher.ch

www.kiwo.de

www.saati.com

www.hp.com



www.luescher.com

www.mutoh.com

For a full list of companies who exhibited at SGIA '07 visit www.sgia.org/sgia07

www.nazdar.com


www.ripware.co.uk

www.siasprint.it

www.norcote.com

www.rolanddga.com


www.sign-tronic.ch

www.nur.com


www.rucousa.com


www.spraywayinc.com

www.oce.com

www.rutlandinc.com


www.stmediagroup.com


www.pleiger.com

www.saati.com


www.sunchemical.com


www.rtape.com

www.sefar.com

www.ulano.com

For a full list of companies who exhibited at SGIA '07 visit www.sgia.org/sgia07

FESPA DIGITAL 2008
Geneva, Switzerland; 1–3 April 2008

Geneva hosts this year's FESPA Digital Printing Europe exhibition

FESPA DIGITAL PRINTING EUROPE 2008 WILL TAKE PLACE AT GENEVA'S PALEXPO FROM 1-3 APRIL AND WILL HAVE OVER 200 EXHIBITORS, MAKING IT 50% BIGGER THAN THE INAUGURAL EVENT IN 2006. FEATURES AT THIS YEAR'S EVENT INCLUDE A FOCUS ON ENVIRONMENTAL ISSUES, A DIGITAL TEXTILE CONFERENCE AND THE FESPA DIGITAL PRINT AWARDS.

The Showcase Theatre will offer visitors a forum in which to concentrate on new technologies, applications and opportunities, and there will also be 'hands-on' classroom sessions for production professionals.

GREEN GUIDANCE

Visitors concerned with environmental issues will find many exhibitors whose products or solutions have earned FESPA's green 'Planet Friendly' badge, indicating that they make a positive contribution to environmentally responsible production, and may also find the 'Making a Green Profit' seminar of interest.

CONFERENCE AND AWARDS

The Digital Textile Conference will take place in the adjacent Crowne Plaza hotel on 31 March and 1 April. There will also be a display of the winning entries from the FESPA Digital Print Awards 2008 at the exhibition, representing some of the best of digital print output in Europe, the Middle East and Africa in eight application categories: vehicle, interior, exterior, décor, packaging, textile, manufactured goods and fine art.

To pre-register for FESPA Digital, go to the website and click on 'Register Now'. SP

Further information:
web: www.fespadigital.com

INCREASED ATTENDANCE AT FESPA WORLD EXPO INDIA 2007

FESPA WORLD EXPO INDIA WAS STAGED IN DECEMBER 2007 AT PRAGATI MAIDAN EXHIBITION CENTRE IN DELHI, INDIA. OVER 12,500 VISITORS ATTENDED THE SHOW, WHICH REPRESENTED A 30% INCREASE IN VISITOR NUMBERS, MAKING IT THE BEST ATTENDED SCREEN AND DIGITAL WIDE FORMAT PRINTING EVENT IN INDIA. THE SHOW ALSO SAW A 30% INCREASE IN EXHIBITOR SPACE AND THE HALLS, ESPECIALLY IN THE DIGITAL LOCATIONS, WERE BUZZING.

Over 12,500 visitors attended FESPA World Expo India

DEDICATED TO DIGITAL

Following a recent survey which indicated that over 50% of the market will be investing in digital in the next year, FESPA is launching a dedicated digital exhibition to meet the demand for innovation and information on digital printing.

FESPA Digital Printing India will take place from 14-16 December 2008 at Bombay Exhibition Centre in Mumbai, India. SP

Further information:
Marcus Timson (Communications Director, FESPA)
tel: +44 1737 229725
email: marcus.timson@fespa.com
web: www.fespa.com

ADDING VALUE AT GLASSPRINT 2007

THE GLASSPRINT 2007 CONFERENCE AND EXHIBITION WAS STAGED IN NOVEMBER 2007 AND WAS DEEMED AN OUTSTANDING SUCCESS BY THE INTERNATIONAL AUDIENCE THAT GATHERED IN FRANKFURT, GERMANY. IN TOTAL, MORE THAN 170 ATTENDEES FROM OVER 20 DIFFERENT COUNTRIES WERE PRESENT, INCLUDING GLASSMAKERS, GLASS DECORATORS AND LEADING SUPPLIERS TO THE INDUSTRY.

PROGRAMME AND PRESENTATIONS

The conference programme demonstrated how printing on architectural, automotive and hollow glass can add considerably more value to the end product. Presentations were made by experts from DIP Tech, Fusion UV Systems, ISIMAT, Werner Kammann Maschinenfabrik, KIWO / Kissel + Wolf, MacDermid, Marabu, PPG, REMCO CHEMIE Rentzsch, RUCO and Saati. In addition, keynote speeches were given by Rob Borgmann of SAS GLAS (part of Saint-Gobain Glass Solutions) and Joe Das, packaging manager at Nestlé.

If you would like to view the full presentations, they can be downloaded for only €95 / £65 / $125. Please contact sales@glassworldwide.co.uk for more details.

EXHIBITORS

Suppliers displaying the latest advances in equipment, consumables, technology and services in the accompanying table-top exhibition included DIP Tech, Durst Phototechnik Digital Technology, Fimor, Fusion UV Systems, Grünig-Intersceen, ISIMAT, Werner Kammann Maschinenfabrik, Kissel + Wolf / KIWO, Lüscher, MacDermid, Machines Dubuit, Marabu, Ormoprint, PPG Industries, Printcolor Screen, Printing International, REMCO CHEMIE Rentzsch, RUCO, Saati, Sefar, Sun Chemical, TCG Technology Communication Group and Tiflex.

THE NEXT EVENT

Plans are already being made for the next GlassPrint event in 2009, and latest information will be printed in future issues of this magazine.

GlassPrint 2007 was jointly organised by ESMA and Chameleon Business Media, publishers of *Specialist Printing* and *Glass Worldwide* – the leading bi-monthly journal for all sectors and regions of the glass industry. Please email subs@glassworldwide.co.uk for a free copy of the Annual ESMA Glass Publication 2008, which includes 28 pages dedicated to printing on glass. SP

Further information:
web: www.glassprint.org

LABELEXPO EUROPE 2007 BREAKS RECORDS

LABELEXPO EUROPE 2007, WHICH TOOK PLACE FROM 26-29 SEPTEMBER IN BRUSSELS, BROKE ALL PREVIOUS RECORDS FOR VISITORS, EXHIBITORS AND EQUIPMENT SALES. IN TOTAL, 24,752 VISITORS FROM 114 COUNTRIES ATTENDED THE SHOW, AN INCREASE OF 7% OVER THE PREVIOUS EVENT IN 2005. THE GREATEST VISITOR NUMBERS WERE FROM AUSTRALIA, BRAZIL, CHINA, INDIA, JAPAN, RUSSIA, SOUTH AFRICA, TURKEY AND THE MIDDLE EAST.

Of the 511 exhibitors at the show, 145 were exhibiting for the first time. By the end of the show, 85% of exhibiting space had been rebooked for the next Labelexpo Europe in 2009.

A SATISFIED EXHIBITOR

Marabu shared a stand with its business partner, Paragon Inks, for its second Label Expo Europe show. Both companies specialise in the field of narrow web printing – Marabu in screen printing and Paragon in letter press and flexo printing – and successfully ran their biggest shared exhibition stand yet.

The stand included a live demonstration of Marabu's 'UltraRotaScreen UVRS' relief varnish with glitter effect, together with Paragon's UV flexo printing on the 'Mark Andy 2200'. A live demonstration on the Franchini stand included Marabu's 'Serigon 350' screen printing inks, and at Kammann's stand 'K61 OS' labels were flat-bed screen printed with high gloss silver 'S-UV 296' and the 'Ultrapack UVC' colour series.

Marabu believes that Label Expo Europe 2007 shows that there is clearly still a demand for rotary screen printing with superior coverage properties and a wide range of effects, and another highlight was new, reusable flexible screens for screen printing.

THE NEXT EVENT

Labelexpo Europe 2009 will take place from 23-26 September at the Brussels Expo in Brussels, Belgium. A new development for the show is the creation of the Digital Experience, which will be a hall with a strong focus on digital technology.

Further information:
web: www.labelexpo-europe.com

VISCOM CELEBRATES DYNAMIC MARKET

THE 19TH INTERNATIONAL TRADE FAIR AND CONFERENCE ON VISUAL COMMUNICATION AND EVENT SERVICES – OR VISCOM ITALIA 2007 – WAS HELD IN MILAN IN NOVEMBER LAST YEAR. OVER 20,000 VISITORS ATTENDED THE SHOW, WHICH FOCUSSED ON 'EMERGING COMMUNICATIONS SOLUTIONS FOR RETAIL', AND THERE WAS AN INCREASE OF ALMOST 10% IN VISITORS FROM OUTSIDE ITALY. THE 326 EXHIBITORS FROM 294 COMPANIES INCLUDED COMPANIES FROM GERMANY, GREECE, SWITZERLAND, FRANCE, SPAIN, PORTUGAL, THE NETHERLANDS, BELGIUM, UK, SWEDEN, NORWAY, TURKEY, POLAND, BULGARIA, ROMANIA, HUNGARY, USA, CHINA, JAPAN AND SOUTH KOREA.

The large format digital printing, sign-making, screen printing and pad printing industries were represented, with solutions for the leather, shoe, furniture and glass industries being particularly prominent, as well as personalisation, promotional and mobile phone applications. The 8th edition of the 'Il Telaio d'Argento' Screen Printing Awards, jointly organised by the Italian Screen Printers Association, received 76 entries from Italian screen printers for the industrial screen printing, textile screen printing, fine art screen printing and young screen printers sections.

Viscom Italia 2008 will take place from 13-15 November in Milan.

Further information:
web: www.visualcommunication.it

ONE VISION IN INDIA

THE ONE VISION ONE WORLD – INDIA SEMINAR ON INDUSTRIAL SCREEN PRINTING: PRESENT & FUTURE WAS HELD IN TWO VENUES IN BANGALORE AND NEW DELHI, INDIA, IN DECEMBER 2007.

Presentations were given by companies from the USA, UK, Switzerland, Italy, France and India, and each technical presentation was followed by a question and answer session. The seminars included a showcase of products by the event sponsors, and there were opportunities for informal networking.

The technical seminars were supported by Screenprinting and Graphics Association of India, ESMA and Asian Screenprinting and Graphic Imaging Association.

Further information:
web: www.screenprintworld.com

FUTURE EVENTS

FEBRUARY
17-19 Sign & Graphic Imaging Middle East (Dubai, UAE)
MARCH
26-29 International Sign Expo 2008 (Orlando, FL, USA)
APRIL
1-3 FESPA Digital 2008 (Geneva, Switzerland)
24-30 Interpack (Düsseldorf, Germany)
MAY/JUNE
29 May-11 June Drupa 2008 (Düsseldorf, Germany)
OCTOBER
15-18 SGIA '08 (Atlanta, GA, USA)
NOVEMBER
4-5 CTS and Digital Workflow 2008 (Düsseldorf, Germany)
6 European Membrane Switch Symposium 2008 (Düsseldorf, Germany)
13-15 Viscom Italia (Milan, Italy)
27-29 FESPA World Expo Asia-Pacific (Bangkok, Thailand)
DECEMBER
14-16 FESPA Digital Printing India (Mumbai, India)

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

OTHER EVENTS

Sign & Graphic Imaging Middle East 2008 will take place from 17-19 February at the Dubai World Trade Center in the UAE. There will be a focus on the retail industry, as well as emerging technologies within the film, advertising, outdoor media and photo imaging industries. Speakers will include representatives of the screen printing, digital printing and graphic imaging industries. For exhibiting or sponsorship opportunities, email: signme@iec.ae or see the website (www.signmiddleeast.com).

The ISA International Sign Expo 2008 will be held at the Orange County Convention Center in Orlando, Florida (USA) from 27-29 March, with 26 March set aside for educational and networking opportunities. Last year's show was the most successful ever. This year's event showcases sign suppliers, distributors and manufacturers. Further information can be found on the event website (www.signexpo.org).

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