ISSUE TWO

2009

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SPECIALIST PRINTING

GLOBAL TECHNOLOGY IN FOCUS

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MESSAGE FROM BRYAN COLLINGS

"Now is the winter of our discontent" as Gloucester said in Richard III. We are hearing gloomy stories from many of our readers and contributors but looking on the bright side, we may actually be well through the worst if the Obama medicine actually begins to do its stuff.

During these difficult times in general around the world, *Specialist Printing* will continue to help guide all users of screen and wide format digital systems through the downturn with a broad range of technology-focused editorial that appeals throughout the industrial, graphic and textile sectors. We have been delighted to hear from our global subscribers that our content continues to provide them with practical solutions to the everyday issues they are facing in the current climate.

If you haven't yet subscribed to this magazine then this is your free promotional copy. To receive the next copy of what has been described as "essential reading" by more than one of our industry leaders, please complete the form on page 55 or subscribe online at www.specialistprinting.com for a total of only €50 / $75 / £40 covering 12 months.

Each issue continues to generate excellent reader response, and it seems Professor Abbott's article on mesh quality in Issue 1 this year has touched on a sensitive subject. We have selected one response from Mike Young which you will find on page 8 of this issue – hopefully next issue we may have a comment from one of the mesh manufacturers.

We are looking forward to meeting readers and advertisers at FESPA Digital from 12-15 May in Amsterdam, The Netherlands. The next issue of this magazine will include an SGIA '09 preview and we hope to bring you a full exposé of the new CPSIA legislation as it will affect our industry in the USA.

Bryan Collings
Publishing Director, *Specialist Printing*

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LATEST NEWS FROM NASMA

Parnell Thill, Chairman of NASMA

Harold Johnston, NASMA's Executive Director

NASMA FORWARDED THE ANNUAL 'MARKET REPORT' SURVEY TO ALL MEMBER PARTICIPANTS IN MARCH. THE AGGREGATE RESULTS OF THE SURVEY WILL BE AVAILABLE FOR DISTRIBUTION TO NASMA MEMBERS DURING OUR MAY MEETING IN KANSAS CITY.

This year's report will include market data from the year 2008 in the following segment categories: screen ink (graphic and textile), stencil films and emulsions, screen fabric and screen chemicals. This year's report will include a survey of 'business metrics' that will include all other members not within the market segments mentioned.

NASMA will hold its spring meeting in Kansas City, Missouri from 4-5 May at the Sheraton Suites Hotel on the Country Club Plaza. The general meeting will be held at the Nazdar facility on Tuesday 5 May. For more information visit the NASMA website (URL below).

Harold Johnston
Executive Director, NASMA

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AN INTERVIEW WITH HARUTIUN MANOUKIAN

Specialist Printing speaks with the new Chairman of ESMA about his role and how the Association is helping its members to face current challenges

Harutiun Manoukian, the new ESMA Chairman

WELL KNOWN IN THE BUSINESS IN HIS ROLE AS PRESIDENT AND CEO OF KIIAN, HARUTIUN MANOUKIAN IS PERHAPS IDEALLY QUALIFIED TO TAKE ON THE POSITION OF THE NEW ESMA CHAIRMAN COMING, AS HE DOES, FROM A FAMILY THAT IS VERY WELL KNOWN IN THE PRINTING INDUSTRY. *SPECIALIST PRINTING* SPOKE WITH HARUTIAN ABOUT THE FUTURE DIRECTION OF THE ASSOCIATION UNDER HIS STEWARDSHIP, THE CURRENT MARKET CONDITIONS FOR ITS MEMBERS, AND HIS VIEWS OF HIS FUNCTIONS AND RESPONSIBILITIES AS CHAIRMAN.

What does the role of Chairman of ESMA mean for you?
Taking on the role of Chairman of ESMA has been a great honour. I strongly believe in the importance of the Association for its members and for the whole market too. ESMA gives me, our Vice Chairman Arthur Vanhoutte, the Board and the new Steering Committee an important duty in maintaining and developing ESMA as an active association which supports all its members in improving the quality of their business inside and outside Europe, in providing convenient tools and deeper knowledge of our markets and technologies to better act in a new world that has changed very much recently.

How long do you expect to be chairman for?
I will try to do my best in leading this important mandate until the end of my term of office which, according to ESMA's new rules, has a duration of two years. They will be two years spent in consolidating and increasing ESMA's value. ESMA must help members by showing how to achieve future success inside and outside the European Union (EU), highlighting, for instance, new opportunities and new markets where digital, pad printing and screen printing processes can be the right answer.

ESMA made significant organisational changes two years ago. What has been the result of these changes?
For sure these changes are very positive, since they led to a brand new and more active approach. With a new organisation such as the present one, ESMA has a General Manager, Peter Buttiens, who is fully dedicated to weaving a net with other associations, other markets and of course among our members, while the Steering Committee will ensure active discussions and decisions to enlarge and empower the medium to long-term strategies.

Results from the market are proving that ESMA was right; the number of members is starting to grow consistently – in 2006 we had around 30 members and now this number has doubled. Today with our members, we represent all the different categories of key manufacturing products for the market related to different technologies – screen printing, digital and pad printing – and this is a real answer to the big changes in the market.

What drove the major changes to the committee and management structure of ESMA that were agreed at the last General Assembly?
During the last General Assembly we were able to approve and formalise an ESMA Steering Committee composed of eight people who represent, as I said, all the different categories of manufacturers. We agreed a more active role for all members to work together on different and stronger Technical Committees. We are demanding because we want to give a better service to improve the quality of their business and of our market!

What benefits does ESMA hope to gain from these changes?
Mainly to have, on one hand, a specific number of people dedicated to the long-term strategy to create more value for its members and, on the other hand, to have our General Manager and his staff implementing it. The ESMA General Manager will be active and focused in developing networks and relationships with other associations in the industry, while all other technical committees, which are fully membership-driven, will be creating more value to share within the network.

ESMA is currently a relatively wealthy association; does it have any specific plans to use some of its funds on major projects in the coming year?
We are a non-profit association which is going through a rapid transformation, becoming a real organisation with a mission, a vision and goals to be achieved. One of them relates to more valuable networking in the worldwide market (such as with Nasma, SGIA, SGAI etc.). Another one is to launch more projects on new technologies, aiming to meet the demands of the new and/or growing markets and always related to the needs of our final customers, and more generally of the market itself.

Some of the projects we are working on are also European Community projects. A potential upcoming project is based on 'enhancing printed electronics'; the goal is to develop low cost silver nano inks for different printing processes to give more potential in the market to develop products. This niche market is currently worth US $2 billion and is expected to rise to US $57 billion by 2019. This is an R&D project consisting of three associations, four universities for research and four manufacturers of nano technology inks in Europe.

'Sensortex' is a project that is based on new special textile inks for screen and digital printing. These special inks are new improved developments of thermochrome, fotochrome or biochrome-based inks. These inks are developed in such a way that they will also be compatible with other substrates. Another interesting project is 'intelligent materials' which is looking into the domain of textiles.

One last forthcoming ESMA project is the integration of RFID in screen printing equipment. The goal is to have more control

and safety with the help of RFID; it will bring more digital information and integration into the workflow of screen printing to help the screen printer to optimise his production environment.

The world has changed and is asking for brand new technology, sustainable processes, low impact technologies … and while people and nations are still discussing these, ESMA is moving forward in this direction!

Is ESMA still collecting statistical information?

Our members need to improve their knowledge of the markets they are working in, today more than ever, since the volume and size of the markets are changing and moving; for our members it is fundamental to have a clear picture of the overall scenario from which to build their own strategies.

ESMA is still collecting statistical information, classifying it in a harmonic way so that it can be easily consulted. It is of basic importance to share this information with ESMA members, though the main aspect is to make them easily usable, updated and really representative of the overall markets inside and outside the EU.

How are ESMA members currently finding the markets around Europe and do they expect the situation to get worse or better over the next nine months?

Premising that the worldwide market situation is, on the whole, a critical one, it is hard to figure out what is going to happen over the next few days or months. For that reason it is pretty difficult to give an accurate picture. A decrease in the market is also combined with the entire financial crunch. I could simply say that the current situation is difficult and can become even worse in the next 3-6 months, but right now is the time to start with a rapid change characterised by an active reaction. In this negative scenario I believe the market is still offering opportunities; these opportunities will be taken only by the companies who will be able to keep taking what is generally referred to as 'the business risk'.

The US and North American market will experience the biggest troubles, given that the deepest crisis started there, however I confidently say that the USA should perform the role of a major player in suggesting solutions. At the same time the South American market, which represents an important reference point for Europe, considers European players its favourite counterparts in terms of a commercial relationship; most probably this market will go through a less important development in relation to expectations, but will still offer good growth possibilities to the EU market.

China is experiencing the strong crisis of the US market, and consequently its growth expectations have decreased. At the same time its internal market request keeps on growing, privileging EU products, which are for them synonymous with quality, tradition and other positive features; this means that for the European market too, there are good chances to develop new business.

In the rest of the Far East the picture we get is much scrappier because it is strictly bound to every single country, although in these countries too, there are excellent possibilities for Europe to do business. No doubt for us it is of vital importance to rely on our best skills such as the high technological level, the know-how, the development of products and processes with low environmental impact. Certainly all these features lead us to be extremely competitive now and in the future as well, not forgetting that norms and regulations are becoming more and more demanding.

In conclusion, we shall expect hard times, but I am certain that Europe, at the very end of this period, could be an important testimonial for the whole world. Finally I would suggest we should be prepared for the worst, but being the best in decision-making, we can still be successful.

ESMA still seems to be mainly focussed on screen printing. Is this true and if not, what is being done to get more involved in digital printing?

ESMA was born as a screen printing and pad printing association, however it has always showed a particular interest in new technologies which could improve or somehow influence the global printing field. Developing this concept, ESMA has significantly invested in the digital segment, having a dedicated Digital Committee, having focused events and seminars to promote and support digital technology. Today digital printing is part of ESMA's objective.

In addition to running some successful seminars recently in conjunction with its media partners, Chameleon Business Media, ESMA also sponsors *Specialist Printing*. Is the Association satisfied with the way this magazine has developed since its launch in 2007?

On the European and global magazine front it was important to have a high value technical magazine to promote screen printing, digital imaging, pad printing and other related processes. ESMA believes that the process of acculturation is crucial for any players in the technical market and a successful magazine such as *Specialist Printing* can make the difference. SP

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FURTHER THOUGHTS ON THE PERFECT MESH

Mike Young responds to Steven Abbot's article in the last issue, which presented views on what's going wrong with our current meshes

Message from the Publishing Director: In his article in Issue 1 / 2009, Steven Abbott offered some insights into what's going wrong with our current meshes and how they might be made a little better (for a copy, email subs@specialistprinting.com). We are pleased to publish here a response from Mike Young.

If you are a manufacturer of mesh and connected machinery who would like to respond to this article by submitting editorial for consideration in a future issue, please email editor@specialistprinting.com

AS A TECHNICAL CONSULTANT WHO HAS SPENT MANY YEARS TROUBLESHOOTING THE PERFORMANCE OF HIGH-END COMMERCIAL AND INDUSTRIAL SCREEN PRINTING OPERATIONS, OR ELEVATING THOSE TO THAT LEVEL, I AM VERY FAMILIAR WITH PROFESSOR STEVE ABBOTT'S CONCERNS ('THE PERFECT MESH', PAGE 8, *SPECIALIST PRINTING* ISSUE ONE 2009). I WOULD LIKE TO ADD A COMMENT OR TWO TO HIS TROUBLING OBSERVATIONS.

Having struggled for a long time espousing fabrics as a primary source to boost ordinary print results to 'extraordinary' through better selection and higher tension, I have often wondered why mesh manufacturers seemingly do a poor job of promoting this virtual. In fact, one supplier actually had the gall to advocate low tension to a client of mine when printing up to 12 colours on clear substrates!

As painful as that may sound, acting as a third party between seller and buyer, printers understandably become frantically uncomfortable hearing conflicting counsel, particularly at times when experiencing costly production failures.

The author

USING THINNER MESHES

Professor Abbott hit the nail on the head by promoting 'thin' [meshes] as better and that mesh manufacturers do not supply as much technical data as they might. Whilst my relationship with meshes and tensioning recommendations are more practical by 'proving it works' on the production floor than perhaps the professor's scientific approach, I recently came across a company using a 77/55 (196/55) PW LE mesh.

They were trying to obtain an opaque appearance printing a full 100% ink coverage onto clear glass. When backlit, the results were awful: streaks, mesh-like marks, faint squeegee chatter marks, pinholes – you name it! When switching them to the finer 77/48 (196/48) variety, at least four distinctive characteristics were immediately observed.

Like good wine, the finish was very smooth, opaque and blemish-free, resulting overall in a truer colour reproduction. The only addition made with the new fabric selection was higher tension, but only to the manufacturer's second or mid-range level due to the large size of the screen. Lessons learnt from this exercise were very predicable, so anyone can join in and do the maths.

ADDITIONAL EXPOSURE

The original mesh had a percentage open area of only 28% while the finer grade was 36%. Put another way, almost three-quarters of the ink never made it to the glass surface – a very poor rate of return regardless of how it is viewed. The newly found percentage increase with the finer mesh open area may not be much better, but it gave the ink coating almost another 30% additional exposure area to the glass surface from a two-dimensional perspective. As most high-end performing print operations will readily concur, it is always the last few percentage points that separate extraordinary results from ordinary.

Furthermore, because the overall fabric thickness was reduced by 10 µm to 80 µm, a greater amount of ink was able to be successfully transferred to the substrate by default. Instead of originally forcing ink through tall narrow openings of the mesh, printing dynamics had radically changed very much in favour of the printer, as the same coating could now be transferred almost effortlessly through a shorter distance in fabric depth and wider openings.

While the mechanics of the mesh permitted easier ink passage due to the larger 'ink' contact area with the substrate surface and making the coating more attractive to be released to, it excavated more, thereby leaving less ink behind in the mesh as opposed to the coarser variety.

A WIN-WIN SITUATION

As the three-dimensional mechanical aspect of the finer mesh improved transferability in general, it exhibited another benefit, albeit small, but an important one for those concerned with image resolution and sharpness. As the squeegee tip was just that little nearer to the substrate surface, its built-in prowess became more influential for superior uniform deposit, image exactness and colour reproduction – all without applying excessive pressure or causing undue wear-and-tear on the tip, or otherwise crushing the physical integrity of the screen itself.

The primary purpose of increasing screen tension closer to the optimum values, as published by suppliers, improves transferability regardless of mesh grade as friction is greatly reduced, thus providing a more dynamic-looking print with less stress demanded on the process and equipment. As a trade-off, finer fabrics require less tension than their coarser cousins.

There is no question that thinner is better – a win-win situation for most discriminating printers of flat substrates. SP

Mike Young is a writer and consultant; he is also a member of the Academy of Screen Printing Technology

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CHEAP ISN'T ALWAYS CHEERFUL

Steven Abbott explains why cheap screen solvents cost screen printers money

The latest cleaning chemicals are safer for printers and the environment

WHEREVER THEY ARE IN THE WORLD, NO SCREEN PRINTER WANTS TO WASTE MONEY UNNECESSARILY ON PRINTING MATERIALS – SO IT WOULD SEEM TO BE A GOOD IDEA TO USE THE CHEAPEST POSSIBLE SOLVENTS FOR REMOVING INKS AND STENCILS FROM PRINTING SCREENS AND FOR GENERAL PRESS CLEANING. HOWEVER, IN THIS AREA LIKE SO MANY OTHERS IN BUSINESS, CHEAPEST ISN'T ALWAYS BEST.

In particular, cheap solvents tend to contain high levels of volatile organic compounds (VOCs) combined with high rates of evaporation. Some of these substances have been known to be harmful by inhalation, potentially causing respiratory and brain damage.

ENVIRONMENTAL DAMAGE

These compounds are also hazardous for the environment, contributing to dangerous photochemical smog and, if disposed of incorrectly, will pollute the water supply. So the effects of overusing highly volatile products containing high levels of VOCs can be damaging to people, the environment and the image of countries and industries that continue to promote their use.

Nevertheless profits are still important in business, especially if a company is trying to compete globally, and it may seem that the risk of using cheap solvents is worth the possible commercial gain by being able to offer low prices against competitors. Unfortunately such a belief may be incorrect; indeed, screen printers who use cheap solvents may actually start to lose business and profits as a result.

THE REASONS WHY

The reasons for this are because, firstly, in almost all countries it's becoming increasingly difficult to find and retain experienced printers who have the skills to print high quality jobs; equally, printers are often all too aware of the opportunities open to them. So given a choice between working in a print-shop where the atmosphere is polluted by high levels of solvents and where their health is at risk, or one where reasonable health and safety standards are applied through the use of appropriate cleaning products, most printers will choose the latter.

Perhaps as importantly, if you supply print to customers in Europe or North America, either directly or indirectly, you will find that they are becoming more and more concerned about the way in which their goods are produced and the possible effect that poor health and safety or environmental practices may have on their image. If they discover that a supplier is using materials or equipment that damage the health of its employees or causes unnecessary pollution, then there is every chance that they will choose to move to a supplier or an alternative print process with better working practices.

It is also worth noting that even if local standards and enforcement bodies are currently prepared to accept the use of harmful solvents, they are likely to come under pressure to improve working and environmental conditions in order to fall in line with what are increasingly becoming global standards; maintaining old working practices may therefore no longer be an option in the near future.

NOT SO CHEAP

These are all compelling reasons to change, but may not on their own be sufficient to convince everybody. Perhaps the most important reason to change is that, very often, cheap solvents aren't as cheap as one may think.

For example, have you noticed how hard it can be to clean a screen mesh on a warm day? However fast the solvent is applied, most of it evaporates so quickly that it doesn't remain in contact with the ink or other residues for long enough to remove them effectively. As a result, a considerable number of wipes and a large volume of solvent is required to achieve a reasonable level of screen cleaning.

Poorly cleaned screens may be acceptable for low quality – and thus low value – jobs but are useless for higher quality work – and high quality is where the future

Modern solvents provide excellent results with manual and automatic cleaning systems

Special formulation results in low evaporation and more efficient cleaning

lies, regardless of the application, from display and floor graphics to membrane switches and touch screens, if printers are to maintain a profitable business.

HIGH QUALITY PRINTING

For high quality printing screens have to be extremely clean, otherwise residues or stains from the old ink will appear as defects in the newly printed materials. If this leads to the first few prints being scrapped before the problem is solved, then the use of cheap solvents suddenly becomes the cause of expensive waste, simply because ink and substrates cost more than solvents.

By comparison, modern solvent products may cost a bit more but are specially formulated so that they don't evaporate so quickly. As a result, they remain on the screen and in contact with inks and residues for longer and are thus able to do a far better job of cleaning the screen, so that it can be used again without problems and without wasting inks and substrates. Additionally, less wipes are required so again there is a cost saving.

Put simply, if the solvent is in the air and in your lungs then it isn't cleaning the screen, so a solvent product that is healthier for printers and safer in the environment is actually better for your profitability.

IMPROVING SAFETY AND QUALITY

CPS, part of MacDermid Autotype, is committed to improving the safety, quality and environment of screen printers, so here is a challenge: if you are using cheap or inferior products then provide CPS with two screens, equally dirty with the same ink, and the company will show you that:

- CPS can clean your screen with less solvent than you are currently using
- your staff will prefer the speed of cleaning with our solvents and appreciate the lack of odour
- the screen will be cleaner and ready to start the next job with no loss of quality.

Although screen printers in many areas will not all change to this new way of working, change inevitably comes about when there is pressure to improve working conditions, the health of employees, the environment and the quality of printed goods.

The benefits that printers have realised by changing to better methods of screen cleaning include reduced staff issues, fewer problems with local regulatory bodies and bureaucrats plus, most important of all, growing sales and increasing profits. sp

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OPTIMISING PRINTING PROCESSES

Andreas Ferndriger outlines the selection criteria for choosing automated processes for manufacturing printing screens

A fully automated In-Line system for screen preparation

THERE IS A SOLUTION FOR TURNING SCREEN PRINTING INTO AN ATTRACTIVE AND PROFITABLE PRINTING METHOD THAT IS FULLY COMPETITIVE, NOT ONLY FOR THE TIME BEING, BUT ALSO IN THE LONG RUN: BY INCREASING THE NUMBER OF AUTOMATED AND STANDARDISED WORK PROCESSES. IN THE PAST THE MAIN FOCUS USED TO BE ON THE ACTUAL PRINTING PROCESS AS THIS WAS CONSIDERED THE MOST IMPORTANT FACTOR, WHEREAS THE SIGNIFICANCE OF A PERFECT SCREEN HAS ONLY RECENTLY BEEN RECOGNISED.

The In-Line system is used on two lines at Danielson in The Netherlands

Nowadays it is common knowledge that cost-efficient printing jobs depend on faultless and perfectly prepared serigraphy screens. Major changes in the market continue to challenge printing companies; these challenges include the following:

- The requirements for print quality keep increasing
- Prices and margins are under considerable pressure
- Customers request short reaction and processing times
- Customers' requirements and wishes must be taken into account, and they expect maximum flexibility
- Special effects are very popular, requiring differentiated printing procedures.

In order to fully answer all these increasing requirements, the preparation of a perfect and low-priced printing screen needs to be addressed with absolute priority. The essential questions you should ask yourself are: am I aware of my overall screen preparation costs? And how much does one screen actually cost me?

The In-Line screen cleaning plant with de-stacking and final drying

A PRACTICAL EXAMPLE

Let us demonstrate the procedures involved and the associated costs, using a practical example.

The benchmark data is as follows: screen size 1000 x 1200 mm, 150 screens per day, prepared in a double shift operation. The first question to be answered is: how can we prepare 150 top quality screens, with maximum flexibility and at minimum cost? One solution would be an automatic In-Line processing line, however this will not be a practical solution for every application.

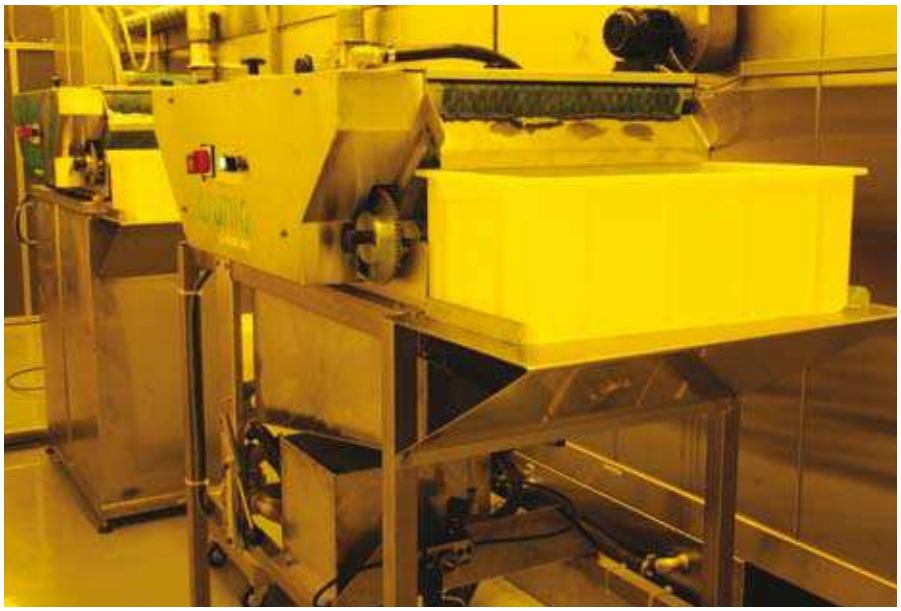
The following general questions should be addressed when considering the respective process steps:

- What do I manufacture myself and what needs to be outsourced?
- What degree of automation do I want to achieve?
- How can I design an optimum work flow?
- Are there any specifications or restrictions with regard to the available space?
- Where are the budgetary limits?
- Does the selected solution allow for a modular build-up, i.e. step-by-step implementation?

Based on the screen cleaning example, the following matters of expense should be considered:

- How many operators will be required

to clean 150 screens in a double shift operation?
- Have the individual steps of the process been clearly separated (i.e. solvent and water processes)?
- How much solvent is needed for one screen (losses caused by carryover etc.)?
- Can the respective solvents be reused after in-house cleaning?
- How much de-coating chemical is required per screen?
- Do the screens need to be de-greased, and how much de-greasing chemical per screen will be necessary?
- What is the water consumption per screen?
- Can the water be reused after in-house treatment?
- Are special products needed for subsequent cleaning (ghost images)?
- What are the costs for waste water disposal?
- What is the total energy consumption for all the processes?



The G-Wash 040 In-House water preparation and solvent cleaning system uses an inclined filter

- What is the space requirement for an overall solution?

All these direct costs can be evaluated by relatively simple arithmetic and every printer should be well aware of them. However, if a print shop decides to forego automation and standardisation, it should be aware of the indirect costs that are often less obvious. These include:

- Costs related to staff protection (gloves, eye and ear protection, masks etc.)
- Carryover of quality fluctuations to the printing process (reject rate etc.)
- Handling, waiting and standstill costs
- Retouching costs: how high are they and what causes them?
- Recruiting and training costs for new staff (e.g. with frequent changes)
- Costs for defective screens (mesh tearing, distorted frames etc.)
- Costs related to environmental protection and regulatory requirements
- Health costs caused by the use of solvents and chemicals for noise reduction etc.

CONCLUSION

In the screen cleaning sector there are countless factors that need to be taken into consideration to ensure that a printing screen can be prepared in the shortest possible time, in reproducible and optimal quality and at the lowest possible price. As a rough calculation, it should cost approximately €1 to clean one of the previously mentioned printing screens.

The same considerations should also be given to other screen preparation processes. These include:

- Screen frames: do I have the right quality with the required frame stability?
- Stretching: should I opt for an in-house process or use a service provider?
- De-greasing: is it really necessary?
- Drying: can I ensure dust-free drying and is the emulsion thoroughly dried?
- Coating: do I use direct emulsion or capillary film?
- Illustration: would it be advantageous to use computer-to-screen technology?
- Development: should the process be manual or based on automatic developing equipment?

As can be seen, there are a number of starting points to reduce costs and optimise the processes. Of course the actual size of the screens plays an important role – the larger the screens, the more important it is to have highly automated and optimised process sequences requiring as little handling as possible. For all screen sizes up to 4000 x 9000 mm, Grünig covers all the processes by offering automated solutions and can supply complete In-Line processing plants with modular extension possibilities.

In-Line with CtS system, automatic developing, de-stacking and final drying

CASE STUDY

Many of the pictures accompanying this article illustrate a fully automated solution involving all the screen preparation processes that was installed in The Netherlands. Danielson is one of Europe's leading manufacturers of man machine interfaces and industrial graphics for the medical and laboratory, control and automation, aviation and aerospace and defence and security markets. Danielson continually optimises its products and solutions and is committed to continuous improvement and enhancement of production processes. The screen printing process is the first step in the total production process and greatly determines the quality of the end product.

Danielson recently invested in Grünig's fully automated screen production lines. Line 1 washes, strips, degreases, dries, coats and final-dries the screens in-line. Line 2 is able to image (using Signtronic's Computer to Screen system), develop, pre-dry and final dry. With this investment, the efficiency and effectiveness of the production processes at Danielson have been greatly enhanced and the quality of the end-products is further optimised. SP

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CLEANING STENCILS USED FOR SCREENPRINTING GLASS

Manuel Schöllig describes the desirable qualities of screen cleaners

PRINTING ONTO GLASS AND CERAMIC DEMANDS THE HIGHEST REQUIREMENTS FROM THE PRINTING PROCESS. STENCIL CLEANING IS AN IMPORTANT FOCAL POINT, FOR ONLY WITH CONSISTENTLY HIGH STENCIL QUALITY CAN THE REQUIRED QUALITY LEVELS BE ACHIEVED.

For printing onto glass, the screen printing process is the current state-of-the-art application. Solvent- and water-based, UV and IR curing printing pastes present the screen printer with new challenges in the field of screen cleaning.

An automatic screen cleaning unit with magazine feeder

Apart from being able to clean combination ink systems (water- and solvent-based) well, suitable screen cleaners should also fulfil the following requirements:

- Manual screen cleaning on press / screen opener: flashpoint > 40°C (EN1010 / BGI 801)
- Screen cleaners for automatic screen cleaning units: flashpoint > 55°C (EN1010 / BGI 801)
- Good ink cleaning results for combined ink systems
- Good drying properties: screen cleaners with a flashpoint > 40°C: < 10 mins drying time; screen cleaners with a flashpoint > 55°C: < 20 mins drying time
- Free from non-drying components
- Mild odour
- Ability to reuse screen cleaners through distillation.

KIWO Cleanline solvent cleaners such as Kiwoclean LM 657 are manufactured with high conductibility (> 1µS/m according to BGR132) to reduce the danger of electrostatic charging. In order to restore conductibility after distillation, Kiwomix LA 1035, a conductibility additive, can be added again.

The use of a screen cleaner which is ideally suited for glass printing ensures consistently high stencil quality and a standardised workflow. This will considerably reduce 'ghost' images or print blemishes caused by residual dried-in printing paste on the screen mesh. SP

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THE ONSET EFFECT

Michael Bush outlines the facets of a digital printer that is economical at runs of up to 1000 impressions

LAUNCHED BY FUJIFILM SERICOL IN 2008, THE ONSET PRINTING MACHINE IS BEING HERALDED AS A BREAKTHROUGH IN INKJET PRODUCTIVITY AND PROFIT-ABILITY. ONSET IS A THREE-BILLION DOTS-PER-SECOND PRINTER WITH A THROUGHPUT OF OVER 600 M^2, SATIN-FINISH PRINT AN HOUR, OR 350 M^2 OF HIGH-IMPACT GLOSS, FINISHED AND STACKED. THIS LEVEL OF PRODUCT-IVITY MAKES DIGITAL FLATBED PRINTING MORE ECONOMICAL THAN SCREEN PRINT AT RUNS OF UP TO 1000 IMPRESSIONS.

The resulting combination of quality, speed, cost and business economics is 'The Onset Effect'. Onset is designed to make money; it prints like-for-like quality at double the speed of many other digital flatbed printers, so the cost-per-sheet is much lower than other printers on the market. It races through large and variable data jobs, producing more than 6000 square metres of print per day, so however graphic print is being produced, Onset offers a new business model.

The machine has Inca manufacturing coupled with Fujifilm image experience. Its ink and print heads are tailored to each other and feature Fujifilm companies' Sericol's award-winning ink technology and Spectra print heads from Dimatix.

AN ARRAY OF PRINT HEADS

The hard part of producing high-speed print is not about moving substrate around quickly, the challenge is to jet ink and cure it fast enough before it has time to flow or distort, stealing the sharpness from the image. The reason Onset can print so fast even with gloss finishes is because it is equipped with 24 print modules, each with 24 print heads, making 576 heads in total arranged across the complete width of the print bed.

Onset is equipped with 576 printheads arranged across the width of the print bed

Not all of this array of print heads is needed at any one time; it has been engineered like this because although digital print head technology is a precision business, occasionally a nozzle malfunctions, producing a flaw in the print. As well as automatic head cleaning, Onset has nozzle fault tolerance where an onboard scanner reads a test pattern, locates any nozzles that are not perfect and assigns a reserve head to jet ink to replace any dots missing from the image.

To cure the three billion drops of ink per second, Onset has four UV lamp systems, matched with Sericol's award-winning Uvijet ink, tuned to work at precise wavelengths. The system makes curing as close to instant as is currently possible and, with lamps balanced on each side of the print carriage, allows bi-directional print. The visible result is a band-free finish for PoP display, exhibition

Onset makes digital flatbed printing more economical than screen print at runs of up to 1000 impressions

graphics, backlit, lenticular and outdoor graphics.

The usual problem with bi-directional machines is gloss / matt banding in the image; when that happens, the only answer is to run more slowly in one direction. Onset's print heads are arranged across the full bed width so the whole image area is printed in the first pass. Further passes build up colour saturation and this eliminates gloss / matt banding usually associated with bi-directional inkjet printing.

Onset produces low-glare satin to high-impact gloss with ease, achieving spot varnish effects without the cost of additional ink so the printer can deliver huge quantities of ink fast and solid or house colours are spot on.

INK PLACEMENT PRECISION

One of the reasons for Onset's quality print lies in pinpoint drop placement and precisely measured droplets. Each of the three billion drops of ink per second delivers precisely 30 pico-litres of ink – any less and droplets get disturbed by air movement or heat and become airborne. Machines that run with smaller droplets in order to claim fine quality results run much slower to avoid misting.

With the acceleration and deceleration needed to roll out a completed bed (5.12 m^2) of print in less than 30 seconds, the vacuum system needs to be powerful. To address graphic print at an industrial level, Onset is designed to handle both heavy workloads and physically heavy media. Its vacuum system holds down substrate weighing up to 40 kg when running at high speed, or 80 kg at mid-speed. As a result, Onset is adept at decorating the full range of graphic display materials and media can be up to 10 mm thick using handling automation, or 15 mm with manual loading.

One feature absent from Onset is zoned beds; this is because with the wide variation in substrate sizes, even a zoned bed doesn't eliminate the need to mask the bed out properly.

At full speed, Onset completes 125 full beds worth of print per hour – about one every 30 seconds. To cope with flat-out speed and long print runs, it comes with automatic media handling options to feed and clear the machine. Recent improvements allow Onset's transport system to work with especially demanding substrates because at that speed, registration has to be perfect. Onset is available with double-sided pins to allow double-sided registration.

RESPONDING TO THE MARKET

Graphic display is becoming more sophisticated. Buyers want to tailor messages for individual locations, customising promotions exactly to local trading conditions. Digital print offers this hugely attractive advantage over screen print. Onset merges graphic and variable text files at full speed so a customer's retail promotion can have different dates or pricing for each store within one overarching campaign, all produced in a single print run.

Another growing influence is the globalisation of business. Here the concern lies in consistency of graphics printed in different locations. The RIP that Onset uses is fast and responsive, giving excellent screening, dots, colour management and colour control, ensuring absolute precision of print and colours from one sheet to the next, or from one machine to another, so jobs can be printed locally in different parts of the world, saving the cost of freighting materials, with total confidence in their consistency. Onset is an industrial machine with the productivity and economies of scale that come with it. SP

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A NEW CLIMATE FOR LARGE FORMAT PRINTERS

The new Virtu RR50

Peter Ruth examines the ecological and economic climate for buying new digital inkjet printing equipment

THE CLIMATE HAS NOW CHANGED, AND NOT JUST FROM WITH GLOBAL WARMING. WE NOW FACE NOT ONLY A CHALLENGING ECONOMIC ENVIRONMENT, BUT ALSO ONE IN WHICH THERE IS A MUCH MORE INTENSE FOCUS ON ENVIRONMENTAL AND HEALTH AND SAFETY ISSUES. IT WOULD SEEM TO MAKE GOOD BUSINESS SENSE TO RECOGNISE THESE 'CLIMATE' CHANGES WHEN BUYING NEW EQUIPMENT.

In the current economic circumstances making investments in 'green' production equipment seems to be the right decision – the little money that is available has to be invested with a view to the long term. In the high volume printing market, new laws and / or taxes enforcing the protection of both the environment and operators exposed to volatile organic compounds (VOCs) will very soon be taken for granted as an industry standard. Appropriate answers for the high volume digital inkjet printing market are required.

FIVE METRE PRINTERS

There are more than 2000 five metre-wide solvent printing machines installed worldwide – almost none of them have an active or passive solution to protect operators and the environment from hazardous VOCs. There are only a few 5 metre-wide UV roll to roll digital inkjet printer models on the market which actually reduce the VOCs outputted – none of them appear to be offering operator protection.

The new Virtu RR50 roll to roll inkjet printer from WP Digital (formerly Spuhl) has implemented the 'blue window' approach known to customers of the hybrid flat bed / roll to roll printers. It offers excellent safety and protection, securing the buyers' investment from an ecological and operators' safety point of view.

However ecology is not the only factor in a purchase decision – the machine has to match productivity expectations for a given print quality to ensure good financial returns.

MATERIAL TRANSPORTATION

The Virtu RR50 roll to roll gives answers to several issues which arise with digital printing on very large, flexible substrates. With substrate feeding it is critical to prevent slippage, wrinkles and distortion of the web – this is the most crucial operational decision factor for a 5-metre digital print machine.

Conventional rubber-coated rollers change in behaviour and geometry over time due to abrasion, exposure to cleaning solvents and materials aging. To overcome these disadvantages the transport rollers on the RR50 are coated with a new high friction and abrasion-resistant lifetime layer of special carbides. Feeding accuracy is given by gearless direct drive technology with superior dynamics for heavy substrates. The proven jetting technology gives good print quality synonymous with the Virtu product family.

The main use of 5-metre large format printers is in the high volume production of seamless banners and building wraps. Most downtime occurs because of substrate changeovers. The un- / rewinders can carry rolls of up to 750 kg; depending on what kind of un- / rewind option is being used, up to three rolls of 1.5 metres can be printed in parallel, powered by a new nesting and job queue function.

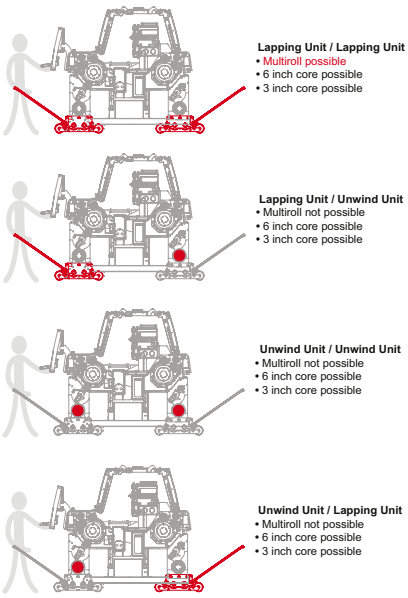
VERSATILITY

Very large format printers usually offer a fixed logistical concept for loading and unloading rolls onto or off the machine. The Virtu RR50 is highly flexible and gives various options for loading and unloading rolls, allowing space constraints because of walls or other machinery on the shop floor to be overcome. If constraints arise in the future, changes can still be implemented to work around the problem.

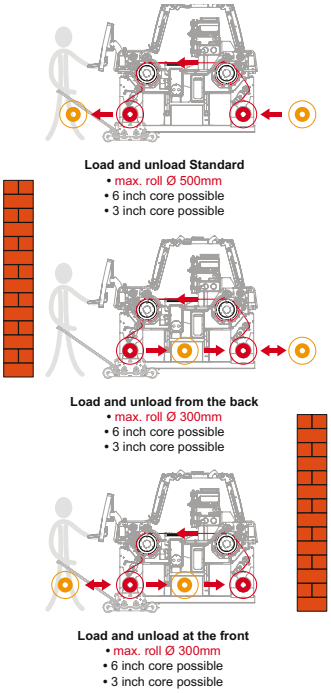
There is also the option to specify an automatic longitudinal inline cutting and / or a semi-automatic cross-sectional cutting device fitted on the machine, or the mesh, banners and fabrics can be tailored by hand or on a separate standard cutter.

Finally speed and looks count. Depending on the printing mode, substrate and head configuration (6 colours 30 picolitres or 80 picolitres) up to 320 m^2/h can be printed. The Virtu RR50 is an elegant, high volume UV roll to roll printer that secures investment with reliability, productivity, safety and versatility, meeting buyers' and their customers' expectations for quality. The machine also has looks designed for the 21st century and will not fail to impress customers who visit the print shop. SP

Peter Ruth is Managing Director of WP Digital



Virtu RR50 features (future) lapping unit or unwind unit options



Virtu RR50 features (future) logistic material roll handling

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DIGITAL PRINTING WITH SOL-GEL INKS

In the first part of his article, Ferdinand Trier introduces the mechanics and techniques of digital printing onto glass and other non-conventional media

DIGITAL PRINTING IS INCREASING ITS MARKET SHARES IN MANY BRANCHES, WHILE TRADITIONAL PRINTING TECHNIQUES ARE EITHER REPLACED OR COMPLEMENTED BY IT. THIS IS BECAUSE DIGITAL PRINTING OFFERS ATTRACTIVE ADVANTAGES: PRINTING CAN BE DONE DIRECTLY FROM COMPUTER TO OBJECT WITHOUT THE EXPENSE OF PRODUCING PRINTING BLOCKS OR STENCILS, MAKING PROOFING EASY AND LOW VOLUME PRINTING AFFORDABLE.

Most digital printers are built to print on paper, foil or textile. Conventional inks for inkjet printing are intended for use with these media and are not designed to adhere to other surfaces. Sol-gel inks offer the possibility of printing on other media due to their superior adhesion to a variety of surfaces – even direct printing onto metal or glass is possible.

But changing to sol-gel ink is just the first step to printing on unusual media. For direct printing onto a rigid material such as a glass pane, modifications to standard printers are necessary which mainly concerns the mechanism, which needs to be able to handle rigid panes of a certain thickness and weight. Finally, the printing parameters need to be aligned to the usually non-porous surface, because a printing speed that is too high will result in blurring.

DIGITAL PRINTING TECHNIQUES

With digital printing, the electronic printing file can be given directly to the printer, which generates the print in different ways. The picture information is defined as a screen of pixels (picture elements), each pixel having its own colour; the higher the density of the pixels, the higher the (spatial) resolution of the picture. With all digital printing techniques, colours are generated from a low number of basic colours by mixing them on the substrate.

Theoretically, three basic colours would be sufficient to generate the complete colour space. In technical applications, at least four basic colours are used (the CMYK system for Cyan, Magenta, Yellow and K = Karbon-black) while in sophisticated or specialised applications, additional colours are used.

INKJET PRINTING

Inkjet techniques are mainly divided into two groups: 'continuous inkjet' and 'drop-on-demand inkjet'. Continuous inkjet printers generate a continuous series of droplets which are not meant to hit the object, they are deflected and the ink is re-used. Continuous jet printers were used in the 1990s for high quality proof prints (the Iris printer); today continuous inkjet is used mainly in low resolution, high speed marking systems (see figure 1).

With 'drop-on-demand' printers, a drop is only generated when it is required to hit the object. Drops are shot from small nozzles onto the substrate. For each of the basic colours used, a set of independently controlled nozzles are brought together in a printing head.

To generate drops for drop-on-demand systems, two techniques are used. With the bubble-jet technique, every nozzle has a small electrical heating element and, when activated, a part of the ink in the nozzle evaporates and the steam pressure throws a small amount of ink out of the nozzle. The element quickly heats up and cools down so the nozzles can fire drops at high frequency. A disadvantage of the bubble-jet technique is the wear of the printing heads, while the evaporating process can leave permanent residues on the heating elements.

With the piezo technique, part of the nozzle wall is made from a material which can be deformed by an electrical voltage (the piezoeffect) and a droplet is ejected at the nozzle end. Piezo inkjet is preferred for decorative printing onto glass (see figure 2).

INKS FOR INKJET PRINTING

Printing with inkjet is a complex interaction of ink, printing head and substrate. There are some contradicting demands for the single components, for instance the ink must not become solid in the nozzle but it should become solid on the substrate as soon as possible, to avoid blurring.

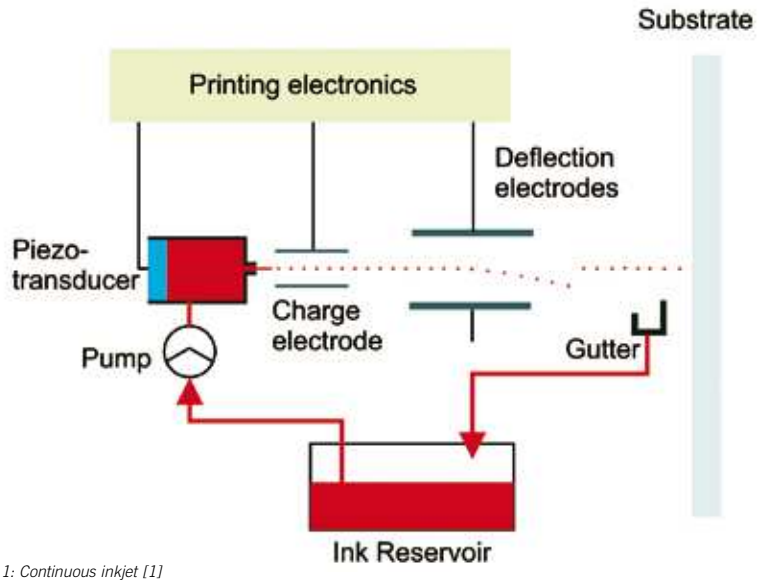

Figure 1: Continuous inkjet [1]

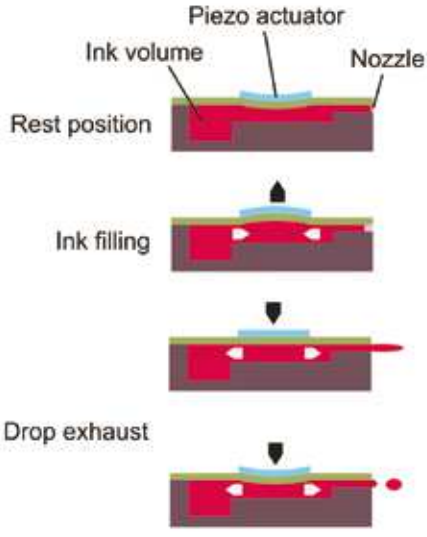

Figure 2: Drop-on-demand inkjet [1]

Density, viscosity and surface energy are important criteria for the behaviour of the ink in the liquid phase. The evaporation behaviour of the ink can be described by the evaporation number and the steam pressure, while the surface properties of the substrate can be described by porosity and surface energy.

Due to the complex interactions of the many influencing factors with inkjet printing, manufacturers of printing machines offer complete systems consisting of printer and ink to print on special substrates.

INKS FOR NON-POROUS MEDIA

Non-porous media is difficult to print on as the solvent cannot be absorbed by the media. If the print stays as a liquid for too long on the media, the print will blur. For the ink system there is a choice of radiation (UV) curing inks and sol-gel inks.

RADIATION CURING INKS

Radiation curing inks are cured immediately after printing by a UV light source to prevent blurring. Though this technique seems to be perfect at first glance, there are also disadvantages:

- The high solid content of the inks (close to 100%) will result in a thick coating, leading to an uneven and rough surface
- It is hard to get good adhesion of the ink to the substrate; pre-treatment of the substrate is often mandatory
- The light resistance of the binder is unacceptable for most outdoor applications.

SOL-GEL INKS

The main components of a sol-gel ink are as follows:

- A film-forming solid embeds the colorant and determines the mechanical and chemical properties of the print
- Solvents are needed for the low viscosity of the ink while printing and, by their evaporation, for fixing the ink to the substrate
- Colorants are needed to give the print its colour; a good light stability is also required
- Additives help to improve properties such as evaporation behaviour and levelling of the ink as well as smoothness, gloss and the scratch resistance of the final print.

THE FILM-FORMING SOLID

With sol-gel, the film-forming solid consists mainly or completely of a sol of inorganic nanoparticles – the most common material is silicic acid. These particles are seized and organically modified to adjust the properties to the desired demands of the ink.

Typical properties of such an ink are:

- The coatings are very light stable
- The coatings have an excellent adhesion to many problematic substrates
- The coatings are relatively hard.

By varying the organic modification of the nanoparticles, many properties can be adjusted to meet varying demands.

THE SOLVENT

Sol-gel inks contain solvents. When the ink is printed onto a non-porous substrate, the only way to remove the solvent is by evaporation which must occur as fast as possible, otherwise the print will blur, but the ink must not solidify in the nozzles of the printing head. These opposing demands can be met by the use of a blend of high and low volatile solvents so longer idle time of the printing head can be avoided. A careful, regularly performed maintenance of the head is also required.

THE COLORANTS

There are two possible ways for the coloration of the ink: either with dyes or with pigments (see figure 3 over page). Pigments are fine coloured particles which are dispersed in the ink; dyes are substances which are completely dissolved in the solvent blend of the ink and stay dispersed in the coating after the solvents are evaporated.

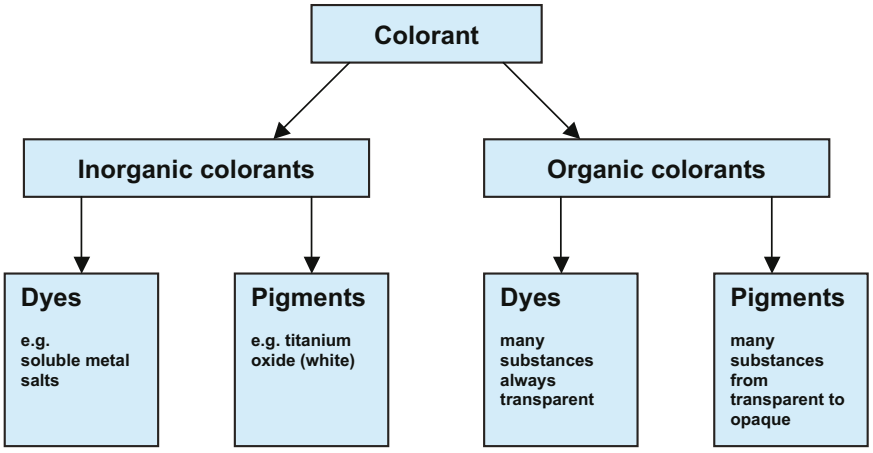

Figure 3: System of colorants

DYE-BASED INKS

With dye-based inks the dye is equally spread on the printed film so the print appears optically homogenous and there is no light scattering, so glass-clear, transparent colour coatings are possible. There is a small amount of surface roughness which is caused by the printing technique itself, especially where a low amount of ink is used; the ink droplets are dispersed and cannot spread and level to form a homogenous film.

These patches can have an undesirable effect – while the thinly printed patches have a dull appearance, the thicker patches appear shiny. There are some remedies to this effect, such as laminating the print to a VSG pane to make this effect disappear completely, or filling the thinly printed areas with colourless ink.

PIGMENT-BASED INKS

Pigments are small coloured particles which are equally dispersed in the ink. After printing, they are embedded into the film. The optical refraction index of the pigments will not exactly match with the refraction index of the film, resulting in light scattering. With organic pigments, this scattering effect can be very small and can be observed only under special light conditions. An advantage of pigments is their good chemical compatibility, even with sensitive coating systems; a disadvantage is the risk of separation and settling in the ink. Settling should be avoided as it will clog the narrow ink channels in the printing head.

LIGHT STABILITY

Light stability is a desired property, especially when printing onto glass. Light stability or light-fastness is the stability of the print when it is exposed to light or to ultraviolet radiation. Poor light stability results in discoloration or fading of the colorant. If the film-forming matrix is not light stable, the print will yellow and peel. Light stability is tested in comparison with the blue wool scale, which is represented by threads of wool which are dyed with eight different blue colorants. Together with the test specimen, the threads are exposed either to sunlight or to artificial light in a test environment. Comparing the fading of the print sample with the fading of the wool threads, a light stability between one and eight can be defined for the print (see table 1).

COLOUR GENERATION

Digital prints are a 100% reproduction of pictures with a wide range of colours. Because it is not possible to have every possible colour in an ink-tank, the colours need to be generated from a few basic colours. Colour generation is achieved by printing dots of basic colours so close to each other that the eye is not able to resolve them as separate dots, so will visually blur to create a mixed colour – real colour generation does not take place on the print itself, but in the eye of the viewer.

HUMAN COLOUR PERCEPTION

There are four different receptors for light perception in the human eye which cover the light wavelength in the range between 380 nm to 780 nm. In good light conditions, only three of the receptors are active; they can be distinguished by their maximum sensitivity according to the wavelength – there is one receptor type with a maximum sensitivity at red light, one type for green light and one for blue light. The receptor types are not only sensitive for a discrete wavelength, but in a range around the peak sensitivity there are three, partially overlapping ranges for the complete visible range (see figure 4).

SUBTRACTIVE COLOUR GENERATION

With subtractive colour generation we estimate that there is a light source for white light. In white light, every wavelength of the visible range is present in equal intensity – all receptors in the eye are stimulated to the same strength, which gives the perception of 'white'. To get colour from white light, we have to filter out (subtract) light at some wavelengths. Technically, this can be done using a colour filter, e.g. a colour glass, and coloured paint also works in this way, absorbing light of a certain wavelength range while the rest of the light is either reflected (with opaque paint) or transmitted (with transparent paint).

With subtractive colour generation, the use of basic colours is helpful – a basic colour absorbs the range of wavelength of one receptor, leaving the light for the other receptors unaffected. If, for example, the red receptor is not stimulated while

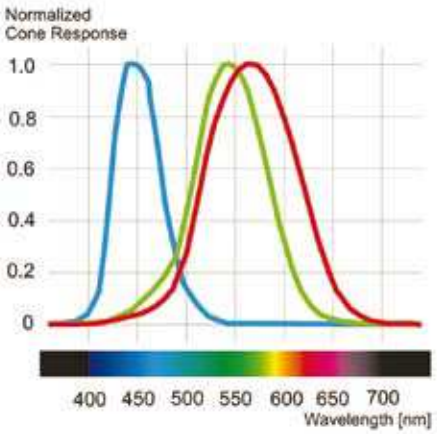

Figure 4: Light reception of the different receptors over the wavelength

Blue wool scale	Light resistance	Corresponding time in middle Europe (outdoor)	Product properties	Dye	Pigment
1	very poor	5 days	Visible change after a few days	Can be achieved with dyes	Can be achieved with pigments
2	poor	10 days	For drafts / and printers use		
3	moderate	20 days			
4	quite good	40 days	For indoor use		
5	good	80 days			
6	very good	160 days	For outdoor use		
7	excellent	350 days			
8	outstanding	700 days		no	

Table 1: Light fastness grades

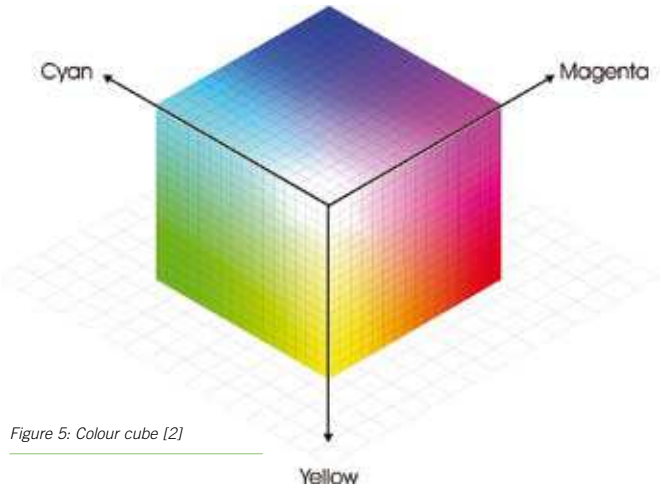

Figure 5: Colour cube [2]

the green and the blue receptors are stimulated, the result is a greenish-blue (cyan) colour hue. If blue and red are stimulated (green absorbed), the colour sensation is a bluish red (magenta). If red and green are stimulated (not blue), the colour perception is yellow.

Cyan, magenta and yellow are the basic colours for subtractive colour generation. Mixing all three basic colours gives black, because every basic colour absorbs the light for one of the three receptors. In practice, the colour black is added as an additional basic colour, resulting in the usual four-colour set of cyan, magenta, yellow and black (CMYK) used in commercial printing.

Subtractive colour generation can be visualised by a colour cube. Figure 5 shows a colour cube with 16 grades of the basic colours CMY, resulting in 16 x 16 x 16 = 4096 mixing colours. Three sides of the cube are defined by the axes of the basic colours. The colours in these three sides are mixed from only two basic colours – there are, for example, 16 x 16 = 256 mixing colours between cyan and magenta displayed. With three basic colours there are 3 x 256 = 768 different colours, which are mixed from only two basic colours, while all other colours in the colour cube (4096-768 = 3328) are mixed from three basic colours.

However these 3328 colours contain a certain component of black, which is important for digital printing because it is possible to replace three spots from cyan, magenta and yellow with one spot of black colour. This also means that colour resolution with 4096 colours can be done, using a maximum pixel size of 16 x 16 dots.

The colour cube with only 16 grades is too crude for technical use; the established system works with 256 grades for every basic colour, resulting in 16.7 million possible mixed colours. This graduation is also the maximum the human eye is able to detect, therefore it is known as 'true colour'. SP

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The second part of this article will appear in the next issue of Specialist Printing; for subscription information see page 55.

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INK ABSORPTION COATINGS FOR SOLVENT-BASED INKS

Roger Sigrist explains why ink absorption coatings are necessary and describes how they are designed

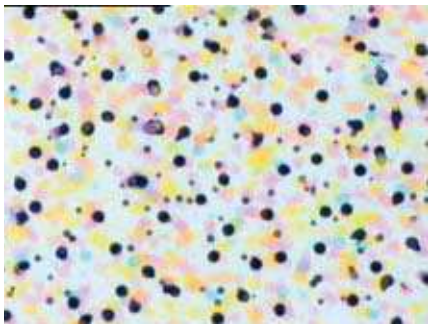

Figure 1: The coating is too strongly etched, the drops are too fine

Figure 2: Poor drying and unfavourable wetting cause individual drops to bleed and develop into unfilled oval dots

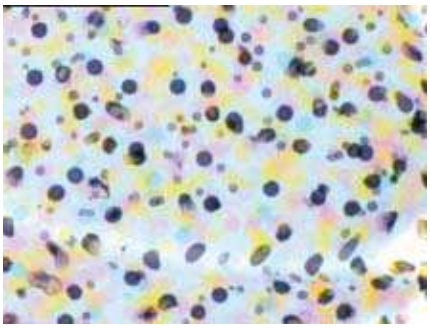

Figure 3: The required absorption of inks leads to the desired droplet shape and thus to perfect print results

SOLVENT-BASED INKJET INKS WERE INTRODUCED FOR THE PRINTING OF SELF-ADHESIVE VINYL FILMS AND BANNERS FOR THE OUTDOOR SECTOR. THE COMPOSITION OF THE INKS ALLOWED THE POLYVINYL CHLORIDE TO SWELL, THUS ACTING AS A SWELLABLE COATING. FOR THE FIRST TIME, IT WAS POSSIBLE TO PRODUCE WEATHER-RESISTANT OUTDOOR ADVERTISEMENTS WHICH WERE EQUAL TO TRADITIONAL SILK-SCREEN PRINTING.

The dye pigments used in solvent inks are comparable to those in aqueous inks in terms of durability. The main advantage of using solvent inks, however, is that media surfaces can be used that no longer react to moisture and barely react to the effects of weather.

If a self-adhesive vinyl film printed with solvent inks is laminated with a protective film, excellent durability is achieved because water or dirt is unable to penetrate from the edge of the media. This robustness means that films can be applied all over vehicles such as trucks, buses and trams.

SUITABLE MEDIA

The statement that "solvent inks print on all uncoated vinyl films" was misinterpreted by many users to mean that all uncoated media could be printed on. In fact, other media with no vinyl coating do not work with these inks – this includes polyester films and fabrics as well as polypropylene. Although paper absorbs the inks because of its absorptive capacity, the printing quality is inadequate.

To provide other basic materials with the same functionality as vinyl films, Sihl has developed a high-tech coating which allows perfect ink absorption. (When selecting chemicals, Sihl deliberately rejected PVC to take into account environmental compatibility.) The quality of the image depends upon the interaction of ink and coating, which has to be optimally adapted to the solvents because these are what cause the surface to swell. After drying, the dye pigments remain on the surface. The speed of this swelling process and subsequent drying determines the homogeneity of the printed image.

If the coating is too easily etched and the solvents evaporate too quickly, the picture lacks the necessary dot gain (see Figure 1). This means that lower density values are achieved, making the print appear pale. In the worst case, banding occurs in the print. If the ink fails to wet the surface properly, this has a similar effect. Wetting and etching, however, must occur at a sufficient speed so that the individual drops set quickly, otherwise it results in coalescence and monochrome areas appear very uneven.

UNCONTROLLED INK BLEEDING

On the other hand, the uncontrolled bleeding of inks can occur, resulting in unfilled ('outlined') ovals (see Figure 2). This effect also reduces the gloss of the printed image and can have a negative impact on edge definition. Ideally, the ink wets the coating well and produces a slight increase in dot size, which has an optimal round shape (see Figure 3). With the help of such a coating, polyester films and textiles, polypropylene films and paper are also compatible, opening up new applications for solvent printing.

The quality of the print, however, also depends on other parameters; control of the heating elements on the printer, in particular, alters the wetting capacity of the inks. A higher temperature allows better wetting but under certain circumstances can cause the media to dry too quickly.

Drying times depend to a large extent on the ventilation in the room. Air has a low absorption capacity for solvent vapours so that saturation soon occurs if there is insufficient air exchange. If the air is saturated, no more solvents can be absorbed so that the print cannot dry. Less volatile solvents require a very long time (24-48 hours open storage) to escape the coating. This procedure can be accelerated considerably if additional heating is used.

SUMMARY

The advantages of coating for solvent inks can be summarised as:

- Better print quality, also with PVC films
- Polyester, polypropylene, textiles, canvas and paper can be printed
- Good drying
- Higher mechanical resistance compared to uncoated media
- Low gloss differences (printed / unprinted).

For solvent-based media Sihl offers photo papers, banners, POS media, canvas, backlit films, white films and billboard and poster papers. sp

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HOW TO MATCH TODAY'S LASER CUTTING TECHNOLOGY TO APPLICATION REQUIREMENTS

In the first part of his article, Markus Klemm advises on how the various features of laser cutting systems translate into capabilities for quality and throughput

LASER CUTTING, OR DIGITAL DIE CUTTING, USES HIGH-POWERED LASERS TO VAPORISE MATERIALS IN THE LASERS' BEAM PATH. THE POWERING ON AND OFF OF THE LASER BEAM AND THE WAY IN WHICH THE BEAM PATH IS DIRECTED TOWARDS THE SUBSTRATE AFFECTS THE SPECIFIC CUTS THAT THE ARTWORK REQUIRES. BECAUSE CUT-AWAY PARTS ARE VAPORISED, THE HAND LABOUR OR COMPLICATED EXTRACTION METHODS OTHERWISE NEEDED FOR SMALL PART SCRAP REMOVAL IS ELIMINATED.

These facts are as true today as they were when laser cutting systems were first put to practical industrial uses in the 1980s, however recent advances in laser cutting technology – and especially those that relate to the sophistication of the software engineering underlying laser cutting controls – have created dramatic improvements in the type of outputs that can be expected from laser cutters.

Today's lower cost laser cutting systems made from less expensive components have far superior capabilities to the expensive systems that were designed and engineered only a few years ago. Top end laser cutting systems are able to consistently cut far more intricate designs in a wider range of substrates and with tighter tolerances than ever before.

The challenge to those making investments in laser cutting technology is to source machines that are well-matched to application requirements. One can still find laser cutting systems in the marketplace that force compromises in quality or production output that should not be considered in light of engineering advances in laser cutting technology. On the other hand, those with more straightforward application requirements are often well-served by lower cost models of laser cutting systems that are powerful and versatile enough for the jobs at hand.


Laser Comparison

FEATURE			
Burn-through marks	YES	NO	NO
Pinholes at start/stops	YES	NO	NO
Consistent edge quality	NO	YES	YES
Suitable for cutting adhesive materials	NO	YES	YES
Consistent quality from closed loop source	NO	YES	YES
Soft marking (spots)	NO	YES	YES
Consistent cut-to-print registration at higher web speed	NO	YES	YES
Optimized for cutting speed	Varies	YES	YES
Optimized for web speed	NO	YES	YES
Profile scan and design	Varies	NO	Varies
Faster single scan heads	NO	YES	YES
Systems integration of all control software	NO	YES	YES
Automatic ATF correct during operation	NO	YES	YES
Possible to change laser settings directly on laser cutter	Varies	YES	YES
Possible to change laser settings on-the-fly while cutting	NO	YES	YES
Able to continuously cut images larger than half of working field without splitting images up	NO	YES	YES
Recognizes cuts automatically when splitting images	NO	YES	YES
Automatically determines job step up and position to start cutting	NO	YES	YES
Job orientation software to automatically angle and position nests	NO	YES	YES
High precision self-calibrating camera registration with simple setup	NO	Varies	YES
Smart edge system for kraft countries	NO	YES	YES
Variable job step criteria	NO	YES	YES
210 micron spot size	NO	YES *	YES**
330 micron spot size	YES	YES***	NO
Complete remote diagnostic capability	Varies	YES	YES
Can combine multiple pictures with varying geometries and step ups in single job	NO	YES	YES
Works seamlessly on cutting variable data images from digital printers	NO	YES	YES
Highest cut-to-print accuracy for working fields 300+mm x 300+ mm	NO	YES	YES
Macro for tightest tolerance applications for 300+mm x 300+mm working field	NO	NO	YES
Macro for tightest tolerance applications for 300 x 300 mm working field	NO	YES	YES
For easy recall saves ALL job related parameters in one file including laser, machine and scanner settings	NO	YES	YES
One step repeat job setup	NO	YES	YES
Image stitching	Varies	YES	YES
Automated image splitting for maximum web speed	NO	YES	YES
Lower prices!	Varies	YES	NO

* 210+ x 200+mm working field
** All size working fields
*** 330+ x 300+mm working field

Figure 1: Laser cutting technology comparison chart

CHOOSING BETWEEN CUTTING SYSTEMS

A preliminary step to sourcing the right laser cutting technology is to first determine if laser cutting capabilities are a good addition to your finishing department. There are numerous advantages to laser cutters as compared to tool-based die cutting systems, most of which derive from the tool-free nature of laser cutters: because there are no tools, there are no costs for tools or production delays for time to make tools.

This is the major reason why laser cutters provide a rapid prototyping niche for those that use them. Laser cutting systems are called digital die cutters because they can take any vector-based digital image and import it into their operating software to set up a job. Today's best-in-class laser cutting systems can complete set-up from these imported digital images in just a few minutes. The 'digital die cutter' term that is used interchangeably with laser cutting speaks to this advantage that tool-free cutting systems provide, especially when used in combination with digital printers. This combination allows one to move from artwork to finished product in just a few hours, or even less for very short runs.

In tool-based mechanical cutting there are always intrinsic limitations from the physical contact between the cutting edge and the material being cut. Laser cutting systems bypass that situation, which makes them able to cut many materials that are very difficult or impossible for tool-based cutting systems to handle. For example, cutting adhesives is far easier with laser cutting systems because of the tendency of adhesives to literally gum up the works in mechanical cutting systems.

THIN SUBSTRATE APPLICATIONS

Similarly, the ability of tool-free laser cutting systems to reliably handle thin substrates is a big advantage. In these thin substrate applications, cut-to-print registration is not constrained by the physical limitations of weighty dies interacting with flimsy substrates. Another example is in the better handling of abrasive materials, which literally wear mechanical dies down such that cutting abrasives with mechanical cutting systems is often prohibitively expensive because dies have to be continuously replaced. Here too, tool-free laser cutting systems sidestep this problem altogether.

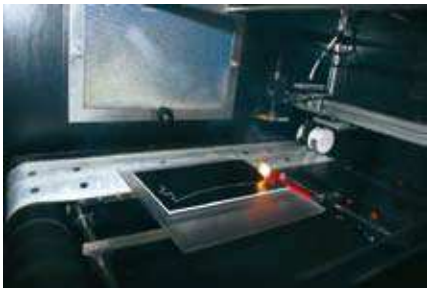

Figure 2: Laser cutter machine cutting a label

The relative ease with which laser cutting systems create special features is also a considerable advantage: perforations, score lines, kiss cuts, consecutive numbering, creasing, personalising and other special features are done as a matter of course. This is especially the case with today's laser cutting technology that uses far superior software engineering to precisely control the movement of laser beams making cuts.

In fact, the only relevant physical limitation in laser cutting systems is the width of the laser beam – for example in 200 x 200 mm working fields or greater, the spot size can be as small as 210 microns in best-in-class systems. While any die-based cutting system would have difficulties in producing corners that are less than 30 degrees, this is not challenging for a laser cutting system, and laser cutting technology also allows one to skip the step of creating mechanical nicks to facilitate parts extraction as is typically required with a tool-based cutting mechanism.

Figure 3: The many applications that can be laser cut

There are limitations to laser cutting systems, as with any technology, but also there are mistaken notions as to what these limitations are. In some quarters laser cutters are thought of only as prototyping tools and not up to the requirements of full production runs. While there are many applications where laser cutting may be slower compared to platen presses, rotary die cutters or optically-registered gap presses, they are considerably faster than the earlier laser cutting systems that used to predominate.

GALVO TECHNOLOGY

In fact, most users of today's laser cutting systems are using them for full production line capabilities. Today's laser cutters are generally galvo (galvanometer) type lasers that make minute adjustments in mirror angles to move laser beams around artwork. This galvo mechanism is considerably faster than gantry systems with XY plotters that physically move lasers as a whole or the whole sheet of material being cut, not just the laser beams.

Newer galvo technology takes this speed improvement to the next level by fine-tuning software to shave milliseconds off most operations, with a combined effect of significant speed improvements: the higher the wattage of the laser, the faster the cutting proceeds in most applications. The difference today is that faster 200-watt and 400-watt lasers that were prohibitively expensive five or so years ago are now available at competitive prices. These new lasers also make a higher quality laser beam, which in turn ensures that cutting quality is maintained even at higher cutting speeds.

The significance of all these combined speed improvements is that today's laser cutters do far more than prototype samples; they are used for full production runs without creating production bottlenecks. (Note: Manufacturers' claims on linear cutting speed are not meaningful in most instances – actual cutting speed is determined both by the complexity of the artwork and ability of the control software to optimise cutting in that geometry.)

Another misconception that one still finds is that laser cutting is a dangerous operation that burdens a workplace with safety risks. Though it may seem counter-intuitive to some, laser cutting systems are in many ways a safer alternative to tool-based cutting systems. The initial installation of a laser cutting system takes care to eliminate the chance of stray beams creating workplace hazards if workers do not wear safety glasses; tool-based systems, on the other hand, pose a continual risk of severe worker injury if they are not operated properly. Although such accidents are rare, they can be catastrophic. Costly injuries to tooling are somewhat more common, such as when technicians leave tiny screws in a cutting area that end up destroying the custom tooling.

HANDLING SUBSTRATES

It is also thought that laser cutting systems cannot handle any substrates, however the boundaries of that limitation continue to shift, along with better engineering of laser cutting technology. For example, polycarbonate substrates used to be beyond the reach of laser cutting technology because of the laser cutters' tendency to leave poorly cut edges with a heavy brown discoloration on the substrate. This is still true of the thickest polycarbonates, but not so with the thin polycarbonate substrates that older systems couldn't tackle.

Many still think that PVC (polyvinyl chloride) is not a good match with laser cutting technology, but that notion is a bit outdated; it is possible to cut PVC materials as long as additional components are added to protect the existing machine components near the laser beam from the corrosive action of PVC cutting by-products, and that appropriate filtering systems are added to protect operators from noxious fumes.

The real disadvantage of laser cutting technology – and the reason that most companies that use laser cutters do so in conjunction with one or another tool-based cutting system – is that it is less cost-effective for many relatively straightforward long run applications which are not beyond the reach of mechanical cutting. If part geometries are easy for a physical tool to achieve, if the substrate is not too thin, too sticky, too abrasive or in some other way troublesome for a physical die, and especially if it involves a relatively long run length where the cost of the die becomes a negligible factor, tool-based cutters (platen presses, rotary die cutters, electro-optically controlled gap press technology) often prove the better finishing tool.

QUALITY AND THE SOFT MARKING STANDARD

Laser cutting systems that were engineered just a few years ago were often not up to the challenges of cutting complex designs, especially when there were many sharp angles in the artwork geometry. One can still find inferior laser cutting systems being sold today that are similarly plagued by the quality problems usually evidenced by pinholes at the start and stop of cutting sequences or burn-throughs.

Figure 4: Burn-throughs

Figure 5: Round corners

For example, Figure 4 shows the difficulties that less sophisticated laser cutting machines have whenever turns are required in sharp edges. Here the telltale black burn-through marks can be seen at turning points that show points where the lasers lingered too long in that spot – the deceleration of the laser beams was so pronounced that it burned through at critical turning points.

Figure 5 shows a laser cutting machine that has the opposite problem: in attempting to avoid the burn-throughs shown in Figure 4, the lasers were accelerated. However, the control of this acceleration was inadequate – instead of the sharp corners that the artwork requires, the edges are rounded. Here, the laser beams are moving too fast to make the sharp corner details.

Figure 6: Soft marking

Figure 7: The final product

Improvements in the software engineering of today's better laser cutting machines obviate these historic quality problems. Soft marking, where the laser movements are better synchronised with artwork geometry and tightly controlled during the entire cutting sequence, eliminate the burn-through problems yet make the sharp angles required, as shown in Figures 6 (detail) and 7 (finished product).

Figure 8: Low frequency laser output

Figure 9: Lack of optimizing laser beam movement

Figure 10: The final product with cutting speed doubled

PINHOLES AND BURN-THROUGHS

Older systems often left pinholes at the start of a cut because of the time it took to move the scan head (mirrors directing the laser beam) off from that initial start point. In contrast, the better quality laser cutting systems of today create better edges, don't leave pinholes at the start of cuts and don't leave burn-throughs at sharp corner turns. This is not because better lasers are used, but because better algorithms improve control of the movement of the mirrors that point the laser beam.

Soft marking is no small feat for the control software of laser cutting systems to achieve, and it is only the manufacturers of laser cutting technology that have made significant R&D investments in better software engineering that can deliver the defect-free soft marking that most applications require.

An example of how cutting speed potentially affects quality is shown in Figures 8, 9, 10 and 11 showing the laser cutting of a small folded box. In Figure 8 the frequency of the laser output is so slow (10 kHz) that the single pulses of the laser give the cut more of the appearance of a dotted line rather than the continuous line cut that is desired. Figure 9 shows a laser cutter without algorithms for optimising the laser movement to geometry and cutting speed when it is operating at a fast cutting speed; here the cutting speed is too fast for the scan head mirrors to follow the contours of the artwork in a synchronised way.

What results is not exact: contours that should be sharp are rounded. What can be seen is the output of a less sophisticated laser

Figure 11: Optimised cutting

cutter where the mass of the scan head mirrors and what it takes to move this mass are not adequately handled by its software. These problems are even more pronounced when the cutting speed is doubled as shown in Figure 10. In contrast, laser cutting systems that can match the cutting speed to the part geometry and optimise the powering on and off of lasers accordingly is shown in the greatly improved quality output of Figure 11. Here, the algorithms the laser cutting software is using can match the speed of cutting to the design in an optimised fashion.

Figure 12: Lack of optimisation during cutting

Figure 13: Optimised laser cutting

IMPROVED QUALITY

Improved quality in today's laser cutting systems is seen not only in better edge quality, but also in the far more consistent cut-to-print accuracy afforded by the new level of systems integration in the best-in-class laser cutting machines. For example, earlier systems had no way to compensate for the rotation in the working field that can occur as the web moves through the laser cutting machines. Today's best systems not only use high resolution cameras, but also integrate the camera information with the laser software that is controlling cutting.

This means that as the camera systems determine any X/Y offset values, they communicate these to the laser control software which is adjusted accordingly. If a laser cutting machine does not integrate inputs from a camera system to the laser cutting controls, it does not have a way to make necessary corrections. Tight systems integration, where one component (the camera) communicates with another (the scan head), is key to the higher quality output of today's best laser cutters.

The quality of the laser source itself will also have a bearing on the cutting quality possible. Better lasers with smaller spot sizes (e.g. 210 microns) will facilitate crisp cuts if the control software uses advanced algorithms to move the better shaped and smaller sized beam along. Better quality lasers combined with advanced laser control software will also avoid the excess

Figure 14: Slitting images

Figure 15: Slitting images

heat that can literally muck up the works in label applications where excess heat can melt adhesives onto release papers, making it difficult to automatically remove labels from the release papers in subsequent production steps.

The type of laser tube a system uses – open or closed – will also have a bearing on how the laser can be controlled and how this affects cut quality. Although open unsealed lasers are getting better in quality, they are still rarely up to the demands of many applications. There are several intrinsic problems with an open laser tube design: CO_2 is usually one of several gases in a laser tube with helium, nitrogen and hydrogen making up the balance; the proportion of each of these gases in the mixture will affect the laser power.

This ratio is apt to shift in an open laser tube design where there is a requirement to frequently change one open laser tube CO_2 tank for another. This makes it is nearly impossible to save settings because there is almost always a difference in gas mixture ratios from one CO_2 tank to another. These shifting ratios affect how the laser powers and the quality of its cut. To achieve the same quality cut an operator will need to fuss with adjustments every time he switches tanks and even then, there will probably be variations. In contrast, the sealed laser tubes are not as likely to change in gas ratio composition and only require replacement every 10,000+ hours of operation. This translates into a much better ability to control cutting and to get a consistent result.

CUTTING SPEED VERSUS WEB SPEED

Today's laser cutting systems are faster for a variety of reasons. One is that higher-powered lasers that cut faster are more affordable, so that most users of laser cutting technology today opt for 200-watt or higher systems. Secondly, the more sophisticated algorithms used in today's better quality laser cutting machines are able to shave milliseconds off each cutting operation, which cumulatively result in faster cutting speeds. The third and most important reason why the better quality laser cutting machines of today are faster is that they are able to better optimise the cutting sequence, resulting in much faster web speeds.

To illustrate the impact of software that can optimise for web speed, see the first example of the US map shown in Figures 12 and 13. In each figure the blue dotted lines show where cutting has stopped while the laser repositions for a next cut. In Figure 12 a cutting sequence is shown where there is no optimisation done by the software on how the cutting sequence should proceed. In such non-optimised cutting, the path follows the lines of how the vector-drawn image was first created in Solidworks or equivalent software. This non-optimised cutting sequence is so slow that the web would only be able to advance intermittently.

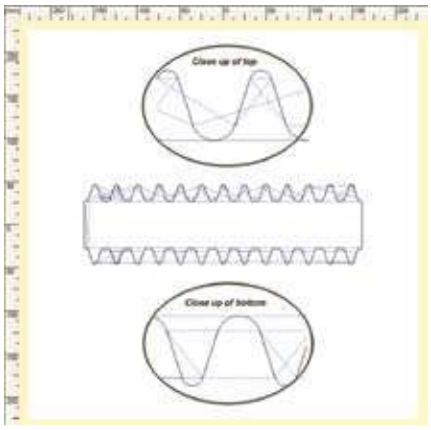

Figure 16: Lack of optimisation during cutting

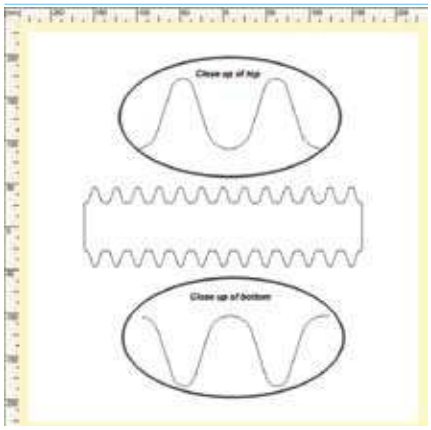

Figure 17: Optimised cutting

In Figure 13 we see a significant improvement in web speed that is done automatically by the sophisticated algorithms in the control software. This improved web speed is determined during the setup of the job before it is run.

A second step in the web speed optimisation during job set-up is shown in Figures 14 and 15, where the maximum web speed is 17% higher and is achieved by splitting the single image of the US map up into two separate images, and optimising the web speed for the split image. This optimisation is also done automatically by the software – in fact, the software can tell the operator whether it is best to cut the geometry as a single image or two images, or four etc. Today's better laser cutting technology can seamlessly stitch these multiple images together, which is done in this case to maximise web speed and in other cases to allow for cutting a design with dimensions longer than the width of the laser cutter's working field.

CUTTING SPEED CLAIMS

It is important not to be confused by various manufacturers' claims on cutting speeds, as this is not particularly relevant to the actual web speed in most applications, which is the important consideration in actual production. Figures 16 and 17 show a scalloped edge design created with older technology that cannot optimise for web speed and the same scalloped edge design created by today's better laser cutters that can optimise cutting sequences for web speed. Note that the marking speed, or cutting speed, is 0.6 seconds in both cases, however the cutting sequence that is not optimised for web speed proceeds at approximately 9% of the web speed shown in Figure 17, where the cutting sequence is optimised for web speed.

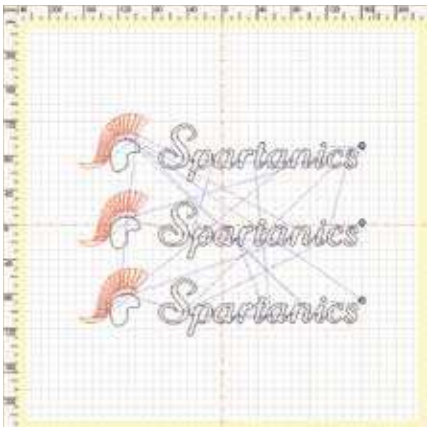

Figure 18: No optimisation

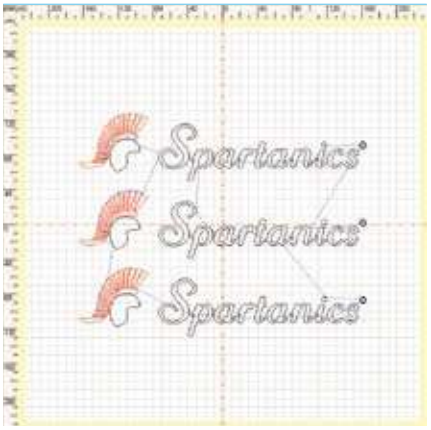

Figure 19: Cutting speeds optimised

Figure 20: Web speed optimised

Figures 18, 19 and 20 (depicting the cut of three rows of logos) show further examples of how non-optimised cutting compares to cutting that is only optimised for maximum cutting speed, as opposed to cutting that is also optimised for maximum web speed. In Figure 18 the cutting sequence is not optimised for speed, but instead proceeds along the lines of how the artwork was originally drawn.

This is the worst case scenario and shows how more primitive laser cutters without software improvements of any kind operated. In this case this means that the cutting proceeds at 37% of the cutting speed achieved as that shown in Figure 19, where the cutting sequences are optimised for the fastest cutting speed.

Until recently, this was the best that laser cutting machines could do. Now, the state-of-the-art algorithms in today's better quality laser cutting machines take this to the next step by figuring in the adjustments in the cutting sequence that would need to be done that take web speed into account. If the web is moving from right to left this means, for example, that the geometry details on the far left need to be cut first and that the way in which the scan heads are moved will depend on the web speed being used.

OPTIMISING FOR WEB SPEED

This is shown in Figure 20 where the cutting sequence is also optimised for web speed, not just cutting speed, so that a 350% faster web speed is achieved. Thus optimising for cutting speed alone can result in slower web speeds; buyers of laser cutting systems are well-advised to ignore manufacturers' claims about cutting speeds and instead focus on demonstrations of the ability of the system software to optimise for web speed. These web speed optimisations are done automatically by the better quality laser cutting systems and do not require any operator training.

The more sophisticated software algorithms in today's better quality laser cutters that optimise for web speed also give an unprecedented ability to continuously laser cut pictures that are longer than half of the working field. Obsolete models of laser cutters that can only optimise cutting for cutting speed and not web speed restrict the sizes of pictures to be cut to no larger than half the size of the working field.

These same algorithms that optimise for web speed also eliminate the need for up to 90% of the hard cuts and quality issues that arise when you try to stitch two images together. They do this automatically, in contrast to obsolete models of laser cutting machines that require operators to manually reset the cutting sequence to avoid hard cuts in the artwork. sp

The next part of this article will appear in the next issue of Specialist Printing; see page 55 for subscription information

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GO GREEN, SAVE ENERGY AND MONEY

Ron Hayden says that the future for screen printing is in adopting environmentally-friendly, energy-saving technology

WHAT EFFICIENCIES SHOULD YOU LOOK FOR IN A MULTICOLOUR SCREEN PRINTER TODAY? IDEALLY YOU SHOULD LOOK FOR SCREEN PRINTING EQUIPMENT THAT CAN REDUCE ENERGY CONSUMPTION CONSIDERABLY, WITH USER-FRIENDLY FUNCTIONS FOR SETUP (ONE THAT ALLOWS JOB SETTINGS TO BE SAVED AND RECALLED LATER), ACCURATE REPEATABILITY, AND AN EXTREMELY ROBUST SQUEEGEE AND FLOOD COATER ASSEMBLY TO DELIVER PRECISE, CONSISTENT IMAGES. OTHERWISE, ALL OF THE PREPRESS WORK IS A COMPLETE WASTE OF TIME AND OPERATIONAL COST IS DIRECTLY AFFECTED.

Energy consumption is not only associated with environmental impact, it is also needed to save money in the overall screen printing production. With growing concerns about being 'green' and conserving energy, print shop owners must study ways to reduce their carbon footprint and save money at the same time. This is not an impossible endeavour; Siasprint has concentrated on all these important areas for over 20 years, with a company focus on 'Innovation and Continuous Improvement', especially in the area of manufacturing multicolour lines.

ENERGY SAVINGS

The nitty-gritty is apparent in the latest energy-saving development, the Siasprint Eco Plus UV Curing System. Whilst many features are incorporated in the system to tackle energy consumption, there are additional hidden benefits. Firstly, the old non-efficient transformers found in conventional curing equipment have been replaced by a PLC-driven electronic control system which provides overall savings of up to 40-50%.

The electronic controller automatically regulates and reduces the power at start-up and during power-down to stand-by mode of 10%. When the scanning cycle is complete the energy is drastically reduced. The soft and instant lamp start without current peaks enables the multicolour line to be shut off for short periods of time during setup, breaks, lunchtime or whenever needed to conserve energy.

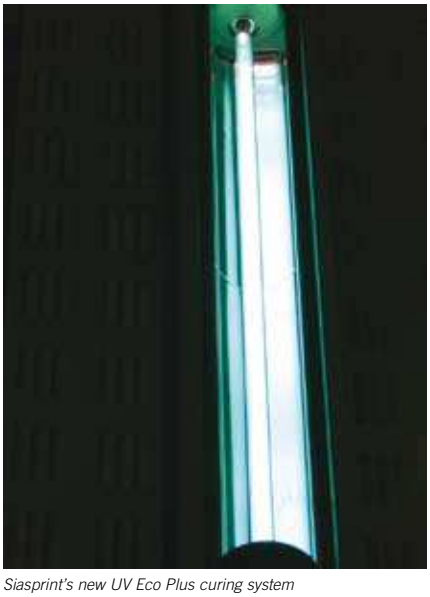
INBUILT QUALITY CONTROL

An important part of multicolour line evaluation must be reviewed in two areas: the total installed power and exhaust air requirements. In these two areas it can be seen how much maximum energy is required to operate such equipment and how much make-up air should be delivered to the shop where the equipment is commissioned. In today's competitive marketplace, you cannot afford to forget about the continual cost of shop make-up air whether it be heated and / or air conditioned. Like the electrical operating cost, this is normally an afterthought – they both consist of an ongoing expense directly related to the operating cost.

The Eco Plus UV System features a stepless UV lamp output and monitoring

Continuous automatic reading of the UV quantity

The electronically-controlled UV plus reflector rotates 180 degrees



Siasprint's new UV Eco Plus curing system

Reducing energy consumption with the Siasprint Multiformula

device that can be adjusted across the full range from 0-100% along with millijoule values which are controlled automatically for the given UV quantity. These quality control measures are a safeguard against under- or over-curing whilst the ink supplier specifications are met and in doing so, are an important tool for ISO quality standards and / or certification. Programmable from the touch panel when the lamp life reduces below the security level, the lamp can be changed out – a beneficial quality control tool that takes out the guesswork and reduces spoilage.

SUMMARY

The Eco Plus UV Curing System is environmentally friendly and cost-effective as it reduces energy consumption by up to 40-50%. It uses less total installed power with a standby mode of 10%, uses less make-up air, offers controlled curing, soft / instant lamp start without current peak, and longer lamp life whilst the reflector housing and electrical connections are totally cooled and preserved.

Constant balances of all energy facets within the system are totally refined – even the most heat-sensitive substrates are not distorted or dimensionally changed. With that said, take charge of the extra ongoing energy expenses associated with make-up air (heating and air conditioning), high peak demand cost and also beware of chilled cooling systems for the curing table and / or a UV end drying system. These technological breakthroughs offer tremendous savings and control overall in the curing process.

In today's uncertain economy, screen printing remains the most economical printing method for advertising. Now it is possible to adopt environmentally-friendly energy-saving technology that will directly lower balance sheets. The new Eco UV Plus System is standard equipment for all new Siasprint Multiformulas and Multigraphicas, and is also available for retrofitting to some existing Siasprint multicolour lines. SP

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The Siasprint Multigraphica

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FROM TECHNICAL ADVANTAGE TO MARKET LEADERSHIP

Hadar Friedland explains how new recyclable substrates for billboards could transform a business

WHILE IT IS WIDELY RECOGNISED THAT WIDE FORMAT DIGITAL PRINTING IS HAVING A PROFOUND EFFECT ON INDOOR AND OUTDOOR GRAPHICS PRODUCTION, UNTIL RECENTLY, SUBSTRATES HAVE RECEIVED LITTLE ATTENTION. THE PAPER-BASED, 12-TILE 6 X 24 METRE BILLBOARD APPEARED TO BE ONE OF THE FEW CONSTANTS IN THE CHANGING WORLD OF GRAPHIC ARTS TECHNOLOGY. THIS IS BECAUSE PAPER WAS THE VIRTUALLY UNCHALLENGED MEDIUM FOR BILLBOARDS AND WHILE NEW PRINTING TECHNIQUES AND INKS WERE EVOLVING QUICKLY, THE MEDIA MARKET REMAINED MORE OR LESS STATIC FOR NEARLY A DECADE.

This situation began to change when the effects of technology began to bring down the cost of billboard printing. Digital artwork, increased automation and productivity and advanced conventional and digital techniques combined to lower the cost of printing. The result was that media became a greater percentage of the cost of billboard printing; in some cases, media costs could account for up to 80 per cent of the job.

New printing technology brought with it opportunities for new substrates to be used. The most significant consequence for billboards was the availability of UV-curable inks, which offer high quality vibrant colours, light fastness and water- and abrasion-resistance for printers, billboard owners and advertisers. In addition to its superior adhesion properties for many substrates, UV-curable ink delivers quick dot fixation, the elimination of spreading of dots or bleeding between dots, and the ability to print with increased ink density.

There are additional benefits of lower VOCs, making the printing process and working conditions more environmentally responsible. Furthermore, UV-curable printers have smaller footprints because they do not require large dryers and since UV-curable ink doesn't solidify until it is cured, it does not dry on the printheads, eliminating the need for lengthy cleaning, purging and other maintenance. Billboards printed with UV-curable inks are dry and ready for mounting as soon as they come off the printer.

NEW OPPORTUNITIES

Today's marketing and advertising world needs to move fast, often responding to the sporting or political events of the day. Brand managers who choose billboard advertising often impose tight turnaround times on print service providers (PSPs).

In September 2008 HP released its Scitex XP2300 printer that was developed especially for outdoor signage's new demands. With its advanced printing technology, this 3 m UV printer can print on a wide range of substrates including inexpensive media such as polyethylene, uncoated PVC, self-adhesive vinyl, mesh, woven polyethylene and textiles that can be mounted immediately without the need for drying.

This printer offers many other advantages: two of the most significant ones are high ink coverage (twice as much as many UV printers) to save ink costs, and very high productivity for fast turnaround times, making it ideal for printing high volumes of durable outdoor signs, banners, posters and building wraps.

Printing with UV-curable ink on plastic substrates can shorten turnaround times

ENVIRONMENTALLY-RESPONSIBLE PRODUCTION

Although paper media is widely used and has many advantages, and is often the preferred substrate for use in certain applications such as POP, street signage and indoor applications, PSPs who are under time pressures and who use the HP Scitex XP2300 printer can take advantage of production efficiencies not offered with traditional substrates, and which also meet increasing pressure from advertising associations for more environmentally-responsible production.

While there is a variety of plastic material for billboards, the most common is a woven polyethylene. It is a robust, lightweight, dimensionally stable material and is resistant to tearing. It is also an excellent medium for UV-curable printing with the desired properties of ink adhesion, abrasion resistance and, of course, water resistance.

Other performance issues highlight the benefits of plastic media. Traditional methods of applying billboard advertisements can offer challenges which can be overcome using plastic substrates. Billboard ads are now often changed about every two weeks, and for ease of application are most often applied directly over the previous ad, which can result in the surface becoming uneven.

With single-piece plastic billboard advertisements an entire 12-tile billboard can be printed on a single lightweight 3m-wide piece of plastic. Mounting becomes an easier process as the advertisement is not heavy, wet and subject to tearing. The old ad is removed and the new plastic billboard is stretched rather than glued in place, ensuring a smooth surface to produce an optimal effect every time. This entire process typically takes about a quarter of the time necessary to mount a 12-tile billboard.

VARIETY AND VALUE

If the graphic arts are about anything, they're about variety. Today's wide and super-wide format printing technologies embrace a broad range of ink and media types including solvent, water-based, UV-curable and latex inks. In addition, there is a range of substrates with choices to be made among papers and plastics; what drives the selection and purchase is important to understand.

Ideally the choice of printers, inks and

media should be made on a firm foundation of technical and business grounds, with anticipated customer requirements and applications heading the list of considerations. This is not, however, always the case; factors such as habit, relationships with suppliers, suspicion of the new and the capabilities of existing equipment and staff often play a part in these choices. Often one can get away with yielding to these, but only for a time.

Competition for quality and speed of response is now more critical than it's ever been. Delivering messages quickly to large audiences is what agencies and brand owners require, so sign and display print service providers need to know what it is now possible to achieve.

DIGITAL TECHNOLOGY

Digital technology now makes it possible and cost-effective to change messages quickly. While there will still be those who put an advertisement on a billboard and leave it there for six months, there are more who will want to take advantage of new technology and innovations to reduce the cycle from fortnightly to weekly to increase awareness and keep their messages fresh.

New digital devices such as the HP Scitex XP2300 printer, a 3.2 m (10.5 ft) roll-to-roll printer designed for high volume production environments, combine high speed and low ink consumption, changing the cost dynamic of billboard printing. One of the first users of this printer is Gardners of Cardiff (UK), a company that has a tradition of being on the cutting edge of printing technology.

"All the ads around the country change every two weeks, so theoretically you have two weeks to print the product," Richard Gardner, company chairman, commented. "But quite often, a campaign will be instigated in reaction to a competitor, and the customer wants to react very quickly within two or three days. So digital is perfect for that. And the HP Scitex XP2300 printer is even more perfect because it allows you to put a lot of material through in 24 hours."

"We need faster machines and lower cost inks," Gardner continues. "The only way to expand the market is to take more work from analogue. At the same time, going green is absolutely critical. The world has changed. Now the majority of work we do is on environmentally-responsible materials such as woven polyethylene."

THE BOTTOM LINE

These new media now offer an affordable, reliable alternative to traditional media such as paper or PVC for high volume, fast turnaround billboard production. With 13 per cent CAGR[1] growth in the billboard market and 16 per cent CAGR for building wraps predicted until 2011[2], the future of printed billboards is bright.

HP is a leading supplier of wide format roll-to-roll UV printers, and with heavy investment in R&D is constantly developing products which respond to the challenging demands of the marketplace and which help PSPs exceed the expectations of their customers, capture new business opportunities and gain a fast return on their investment. sp

Billboards printed on seamless plastic substrates can be installed and removed in 10 minutes

1 Compound Annual Growth Rate
2 IT Strategies 2008 Applications Report

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THE SOLUTION TO HIGH VOLUME RFID PRINTING

Wim Zoomer outlines the history and uses of rotary screen-printed Radio Frequency Identification antennas

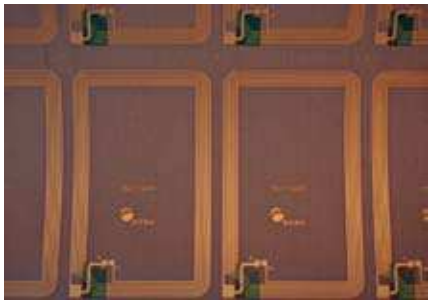
THE SHORTEST DISTANCE BETWEEN THE FRENCH COAST AND THE UK WAS ONLY 30 KILOMETRES. ALTHOUGH DURING WORLD WAR II THE BRITISH, AMERICANS AND GERMANS WERE ALL USING RADAR, THERE WAS NO WAY TO IDENTIFY WHICH PLANES BELONGED TO THE ENEMY AND WHICH WERE THEIR OWN PILOTS RETURNING FROM A MISSION.

The British physicist, Sir Robert Alexander Watson-Watt, headed a secret project to develop the first active 'friend or foe' system by putting a transmitter on each British plane. When the transponder received radar signals from radar stations, it began broadcasting a signal back that identified the aircraft as friendly. Contemporary RFID works in the same way: a transponder attached to an object receives a radio signal and wakes up. The transponder either reflects back a signal (passive system) or broadcasts a signal (active signal).

RADIO FREQUENCY IDENTIFICATION

RFID (Radio Frequency Identification) is a technology enabling a wireless and unique identification of people, animals and products using radio signals. RFID will become an essential tool to make processes, such as logistical transport, retail and security, more efficient and more intelligent.

RFID is a method to identify objects using radio signals. RFID tags or transponders connected to objects identify themselves using the radio signal when they receive a signal from a reader or interrogator. The technology is much more than a barcode replacement – one RFID tag may incorporate an anti-theft feature, it may be used to prove ownership or it may provide authentication and speed up shopping.



Rotary screen printed HF RFID antenna complete with (green coloured) bridge and connection across the bridge

The read range of tags varies depending upon the application; RFID tags with a range of just a few millimetres can be embedded in banknotes and vouchers for sorting and authentication. For logistics often a range of 3 metres is required to read many tags simultaneously, whereas road tolls require read ranges of up to hundreds of metres.

RFID TAGS

The essential parts of an RFID tag are the chip and the antenna. The microchip carries the digital data of the object; the amount and the type of information depends on the chosen data format and the available memory capacity.

The antenna is connected to the chip and transmits radio signals independently or uses the energy of the received radio waves to return a signal. HF (High Frequency) tags operate at 13.56 MHz and are provided with an antenna consisting of a 4-6 windings coil running at a read distance of less than one metre; examples are credit and debit cards, laundry tickets and library books.

The UHF (Ultra High Frequency) tags are in the frequency range 300 MHz to 3 GHz and are primarily in the 860-956 MHz range. The read distance of UHF tags is 3-6 metres (in other words, the higher the frequency the shorter the antenna). Due to its characteristics, UHF tags are used, for instance, for supply chain management at pallet and baggage handling at airports.

ANTENNA MANUFACTURE

Manufacturing the antenna is the initial step of the production process. Antennas for HF and UHF application may be produced using three different methods: direct printing using a silver conductive ink, the subtractive process and the additive process.

An etched UHF antenna

A rotary screen printing unit to print silver conductive ink for reel-to-reel antenna production

Direct printing: a silver conductive solvent-based ink is used to print the antenna on a plastic or a paper substrate. For this application screen printing is an appropriate technique to manufacture both HF and UHF antennae. These antenna types require different ink deposits. By changing the stencil, the ink deposit can easily be modified. After drying by hot air, the silver particles on the substrate create the electric circuit – the eventual antenna.

Subtractive process: The substrate is a laminate (instead of paper or plastic) consisting of 20-25 microns of copper or aluminium laminated on a plastic carrier film. On the metal side the mask is printed using an ink that is etch-resistant to particular chemicals. The printed mask is the positive copy of the shape of the antenna. The etch-resistant image protects the metal underneath from being attacked by the etching agent.

The aggressive etching agent dissolves the metal that is not covered by the mask. The mask is removed from the metal by chemical stripping and then the metal antenna comes into sight. Despite the apparently complex process and the environmental impact (due to the chemical waste), several companies apply the subtractive method, which is also called 'print & etch'.

Additive process: instead of removing matter, the additive process adds a substance. A special ink contains electrically-conductive particles. On a plastic substrate such as PET, a screen prints an antenna circuit of a few microns thickness. In the next galvanising process, electroplated copper re-enforces the previous print up to a thickness of 5-15 microns, achieving the required antenna characteristics. Theoretically there is no chemical waste. The additive process is also known as 'print & plate'.

To complete the antenna, the ends of the HF antenna coil must be connected. A resistor is screen printed to create the 'bridge', crossing the windings of the antenna. Across the bridge both ends of the coil are connected by screen printing a silver conductive stripe. So screen printing is the method for manufacturing the complete antenna.

ROTARY SCREEN PRINTING

All the different methods require a fast, accurate and consistent technique to transfer the pattern to the substrate. Whether we consider direct printing the silver conductive antenna, use etch-resistant printing on the substrate or print the bridge and connection, it can be done using a versatile, fast and efficient technique called (reel-to-reel) rotary screen printing. After all, the image or mask must be applied on a substrate.

Rotary screen printing is the solution to medium and high volume antenna manufacture. On the moving web the screen cylinder transfers the image by continuously rotating the screen cylinder against the web. Inside the screen the squeegee pushes the ink onto the substrate. As the image is transferred without any deformation on the screen, the registration of the successive images is exceptionally accurate. Web widths vary from 500 mm up to 1000 mm. The printed ink is dried in a hot air dryer.

The cost-effective rotary screen printing technique is suitable for medium to large amounts of RFID antennas. Print speeds vary between 12 and 20 m/min. The emulsion on a rotary screen can be stripped down to allow re-coating and re-imaging of the screen for another print job. The productivity of rotary screen printing is high. Using a print speed of 15 m/min the capacity of rotary screen printing is over 600,000 credit card-sized HF antennas in one shift on a 500 mm print width web. By just printing one shift a day for a year, 120 billion RFID antennas will be produced on a rotary screen printing machine!

THE FUTURE

RFID specialists expect a substantial increase in RFID use between 2010 and 2015. Regardless of the chosen production process of an RFID antenna, the antenna's pattern is always transferred onto the substrate using a print technique. Often screen printing offers the most suitable solution. SP

A rotary screen printing press prints RFID antennas in one pass

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DIGITAL TECHNOLOGIES AND THE APPAREL DECORATOR

In the second part of his article, Johnny Shell continues his outline of the digital technology available for apparel decorators wishing to upgrade

HEAT-APPLIED VINYL

Heat-applied vinyl, sometimes referred to as CAD-material, is a roll good material that can be cut on a roll or flatbed vinyl cutter / plotter. The material is available in a variety of solid colours (such as glitter, reflective and flock) and other popular choices. In general, the material is cut in reverse and heat-applied to the garment. Heat-applied vinyl is perfect for team uniforms, names, numbers and similar needs for extremely durable graphics that may outlast the garment (see Figure 5). The overall 'hand' will vary based on the material used – it is, after all, a film of vinyl or other material applied to the garment.

The process involves creating a design in a graphic application that will be cut; you can usually use popular programmes such as CorelDRAW or Adobe Illustrator. The design is sent to a cutter / plotter which cuts the design in the chosen vinyl film. After cutting the excess material is removed, leaving only the intended design. The design is heat-pressed following the application instructions provided by the supplier for that product. Typical heat press settings are between 98 °C and 204 °C (210 °F and 400 °F), depending on the type of fabric being used. The heat activates the adhesive on the material, which attaches the material to the garment for a permanent bond. There is a diverse range of material available for most substrates, including nylon, which requires a more aggressive adhesive than a polyester or cotton material, and Lycra, which requires a material that will stretch with the fabric.

Getting started with heat-applied vinyl generally requires a cutter (US $500-10,000 / €400-7980), a computer and a heat press (US $600-2000 / €478-1595). The vinyl material will range in price from one to four cents per 6.5 square cm (one square inch). Heat-applied vinyl is relatively easy to use with a short learning curve; it has excellent durability and few fabric choice restrictions for the application. However, the technique does not allow the use of photo-realism, gradients or any type of continuous tone image. Multi-colour designs are possible though labour-intensive, because each colour is cut and registered to other colours used in the design.

Another labour-intensive drawback to heat-applied vinyl is the task of 'weeding' excess material from the carrier film after the design has been cut. Intricate detail in the design means time and care must be taken in weeding to keep the various components intact. Often, this process can remove design components such as the title (the 'dot') above a lowercase 'i' or 'j'.

Figure 5: Heat applied vinyl is perfect for team jerseys, names, numbers and other applications where photographic images are not required

PRINT-AND-CUT MEDIA

Print-and-cut media is similar in nature to heat-applied vinyl but can support photo-realism, gradients and continuous tone images on light and dark garments (see Figure 6). Material is available for both aqueous and solvent-based inkjet systems in widths of 43 cm (17 inches), 60 cm (24 inches) up to 137 cm (54 inches). Media costs depend on a number of factors. For light garments, 43 cm by 15 m (1.4 x 50 feet) rolls are about US $50 (€38.5). Similarly sized rolls for dark garments are roughly US $90 (€69). Heat press settings usually indicate a temperature of 176 °C (350 °F) for about 20 seconds.

Figure 6: Using either solvent or eco-solvent inkjet, print-and-cut media provides a solution for decorating dark fabrics with inkjet technology

Figure 7: New economical equipment allows for the creation of custom templates used for heat-set media such as this rhinestone image

Once the image is printed, the material is cut using a cutter / plotter and applied to a garment with a heat press. The durability of print-and-cut media is high, similar to that of heat-applied vinyl. The 'hand' is also similar to vinyl since there is a solid film fastened to the garment. The technique is perfect for short-run, custom and personalised items providing the ability to decorate a wide range of fabrics with full-colour, photo-realistic images.

Equipment needed for a print-and-cut workflow includes a water or solvent-based inkjet printer (US $2000-15,000 / €1540-11,530). Expect to pay a bit more if the printer includes an on-board cutter; if it doesn't, separate cutter systems are available with prices starting from around US $2000 (€1540) for a 60 cm (24 inch) desktop model. Cutters with wider widths are also available. A heat press is also needed. Films are available for a wide assortment of substrates including leather, nylon, Lycra and Spandex; they come in a range of finishes including matte and glossy.

Print-and-cut films can be designed for aqueous printers such as Epson and solvent-

based printers such as the Mimaki JV3, JV33 and JV5, as well as Roland's HiFi and AJ 1000 and HP's DesignJet 8000, 9000 and 10000. Films are also available for thermal transfer resin ribbon devices such as the Gerber Edge. Print-and-cut media will work on just about anything – it can be easy to use but has a learning curve when using a solvent-based system. Additionally, solvent-based inkjet systems are more expensive compared to their water-based counterparts. The technology combines the durability of a heat-applied vinyl with the full colour capabilities of an inkjet printer and is a good solution for dark garment decorating.

HEAT-SET MEDIA

Heat-applied rhinestones, nail heads and sequins have regained their popularity over the last few years (see Figure 7). Newly-introduced digital routing technology is allowing shops to create their own heat-set rhinestone transfers to easily accommodate low quantity runs. Using standard plastic engraving stock, the router engraves a design template to house the selected stone size. The stones are arranged in the template (adhesive side down), picked up and transferred to the garment using a hot-fix tape which keeps the stones arranged as they are in the template.

Rhinestone media comes in several material choices, sizes and colours. It can be real crystals, such as Swarovski rhinestones, or man-made simulations that are affixed using a heat-activated adhesive that is applied to the back. The EGX350 desktop engraver from Roland, with a price tag of approximately US $5500 (€4230), was designed with rhinestones in mind (see Figure 8).

The device easily allows for creating custom rhinestone apparel in addition to decorating gifts, awards and promotional items by personalising them with names, events or special dates. The engraver will handle a wide variety of materials that include plastic, aluminium, acrylic, brass, wood and stainless steel. Rhinestones cost from US $3 to $10 (€2.3-7.7) for one gross (144 pieces). The engraver stock cost is $2-5 (€1.5-4) for a 23 x 30.5 cm (9 x 12 inch) sheet.

Although not entirely digital, rhinestone appliqué provides a non-traditional decorating method at a low investment cost. For about $7000 (€5400) the engraver, heat press, rhinestones and ancillary materials necessary for production can easily be purchased. The drawbacks are that the process is labour-intensive and relatively slow in average production workflows.

DIRECT-TO-GARMENT INKJET

Fast production times, high quality, full-colour images, unlimited customisation and ease-of-use are just some of the benefits associated with direct-to-garment inkjet printing (see Figure 9, over page). Direct-to-garment inkjet printers are being used by apparel decorators who are eager to gain additional market share and accommodate short-run business that previously was turned away. With average run lengths dropping, having the capability to print small-quantity custom designs at higher margins is an attractive feature to those who have adopted direct-to-garment inkjet technology.

Direct-to-garment inkjet devices use drop-on-demand piezoelectric technology which produces ink drops when voltage is applied to a piezoelectric crystal that vibrates. This vibration creates pressure in the ink reservoir and ejects an ink droplet. A water-based textile pigment ink designed to provide full-colour photo-realistic images is used. Once properly cured, the image durability is quite long. The 'hand' of the finished print is similar, yet lighter, to that of screen printing. Cotton is considered to be the optimum fabric for decorating with a direct-to-garment inkjet device, but some manufacturers claim decorating other fabric blends is possible – testing beforehand is recommended.

Many direct-to-garment inkjet devices allow printing on white or light shirts by using a standard set of inks and print driver. This method allows the user to choose the printer by name in the print dialogue box, similar to selecting a particular printer on an office network. When using this method, the user creates an image within a preferred graphic application and selects "print". When printing to dark garments, white ink must be introduced and will require workflow adjustments. When printing with white ink, the print driver option usually isn't possible. The user typically works with a manufacturer RIP or secondary software application that generates a white under-base and highlight white for printing onto dark fabrics. The RIP then communicates with the printer so that only the white head or channels in a head fire during the under-base pass.

Additionally, the RIP dictates the highlight white that will be printed when the CMYK colours are printed. When printing a light or white shirt with a device using white ink, the operator may need to use the manufacturer's RIP or software so that only the proper colour channels in the print head fire during printing. If the standard print driver is used, white ink could be printed along with the other colours

Figure 8: Roland's EGX-350 uses standard engravers stock to quickly cut templates used for rhinestones

as the driver assumes a standard ink set is being used.

Cure temperatures are specific to the ink being used, so the manufacturer's recommendations should be followed. Generally, cure temperatures for many available devices hover at 176.7 °C (350 °F) with cure times ranging from 30 to 60 seconds or more. Cure times of two minutes or more may be suggested by the manufacturer when printing with white ink.

ADVANTAGES OF DIGITAL

Many find the biggest advantage of digital technology is its ease of use in producing vivid, full colour photographic images. A four-colour process photographic print that actually looks good and generates a profit when using screen printing can be challenging. Direct-to-garment inkjet requires less space and is a low-cost investment when compared with screen printing, which needs a larger amount of valuable floor space and potentially tens of thousands of dollars in equipment costs. It also produces little mess, requires no screens, uses little solvent and could save facilities time by avoiding set-up delays or downtime caused by inadequate screens.

As with any technology, direct-to-garment inkjet has its disadvantages. In relation to the other technologies discussed here, it is at the upper end of the price scale in most cases. For large-run lengths, it can be slow (when compared to some technologies such as screen printing) and can cost a company more to produce a job.The break-over point will depend on the individual shop, but reports of companies using direct-to-garment devices to produce thousands of prints are becoming quite common.

The equipment list for direct-to-garment inkjet includes a graphics computer, the direct-to-garment inkjet device (US $10,000-200,000 / €7700-154,000; many are less than $25,000 / €19,000) and a heat press or conveyor dryer. Direct-to-garment ink costs range from a few pennies to more than $2 per print. Unfortunately, they do not have the necessary abrasion resistance required for athletic printing, nor is the ink capable of printing special effects such as glitter or gels. Matching Pantone or custom-spot colour can be challenging because direct-to-garment inkjet devices use ink sets based on CMYK. While many Pantone colours are achievable in the CMYK colour space, a considerable percentage are not.

PRE-TREATING GARMENTS

With most available direct-to-garment inkjet devices, printing on dark shirts with white ink entails the additional tasks of pre-treating the garment, extra print passes and more frequent maintenance procedures. Pre-treating a garment involves using a solution that can be applied using a high-volume, low-pressure (HVLP) spray gun or automatic spray equipment which is included on the printer or as a standalone unit.

Separate pre-treatment machines are coming to market that reduce variability in this process since the application consistency and pre-treatment's repeatability – when applying manually with a spray gun – is very important. Applying too much will affect how well the image holds up in a laundry cycle; applying too little will cause the white ink to fall down into the shirt's dark fibres instead of sitting on top to build the necessary opacity.

The gun's spray pattern can also affect the resulting print, so the nozzle should be kept properly adjusted and cleaned to avoid spurts. Using white ink will virtually double the total print time for each shirt. White ink is printed separately in the initial print pass and deposits the under-base. This print pass is followed by a second pass that deposits the colour and sometimes a highlight white. The big advantage of white ink is the ability to decorate any fabric colour, but the disadvantages include longer print time, increased ink cost compared with a digital print on a light fabric, and added workflow and maintenance steps.

EMPOWER YOUR SHOP

The worldwide decorated apparel industry is rapidly changing. In order to remain competitive, shops must adapt to keep their existing customer base and find additional markets. Several technologies can empower shops with the ability to decorate apparel (and other items) in different ways.

There are lots of potential markets with needs that can be met with the latest apparel technologies. Having a business sit stagnant won't work in today's economy – you must decide where to go in the future based on the dynamics of your business strategy in order to maximise your customer base. SP

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The first part of this article appeared in the last issue of Specialist Printing; to order a copy or to subscribe, go to www.specialistprinting.com

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

Figure 9: The Brother GT 541 is among the many direct-to-garment inkjet printers being used to produce full-colour photographic images on garments

SGIA GUIDE TO GARMENT DECORATION

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

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

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

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UNDERSTANDING REACH REGULATIONS

Elaine Campling explains the conditions for registration of chemical substances under the EU's REACH regulations

FOR THOSE READERS UNAWARE OF REACH, IT IS THE REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS REGULATION (EC) 1907/2006, WHICH CAME INTO FORCE ON 1 JUNE 2007. THE REACH REGULATION IS REPORTED TO HAVE BEEN INTRODUCED BECAUSE MANY CHEMICAL SUBSTANCES IN USE WERE NOT CONSIDERED TO HAVE BEEN PROPERLY EVALUATED PRIOR TO 1981, WHEN IT THEN BECAME NECESSARY TO PROVIDE SAFETY INFORMATION FOR NEWLY-DEVELOPED CHEMICALS PRIOR TO PLACING THEM ON THE MARKET.

REACH has been enacted against a backdrop of concerns expressed about the use of certain chemicals, which is partly due to the reported accumulation of these chemicals in the environment and health concerns associated with their production and use. REACH makes industry, rather than regulators, responsible for collating health, safety and environmental information on substances, repealing over 40 pieces of related chemical legislation.

REGISTRATION DUTIES

Registration duties apply to the following:

- European manufacturers and importers of substances of 1 tonne or more per annum.
- European importers of preparations, when any substance is imported by an organisation above the 1 tonne threshold. This effectively means that if an organisation imports preparations, it will be necessary for the volume of these imports to be considered and if there is the possibility that any one substance could be present at the 1 tonne per annum threshold, then registration of this substance or substances will be necessary.
- European article manufacturers and importers, where there is intended release of a chemical substance from the article, the total substance present in the articles with intended release is produced or imported by the organisation at the 1 tonne per annum threshold, and the same substance has not previously been registered for an identical use.

Manufacturers from outside Europe are not permitted to register, but may appoint an 'Only Representative' in Europe to register on their behalf. Registration involves a Lead Registrant (discussed later in this article) submitting a registration dossier including a safety dataset to the European Chemicals Agency (ECHA), the Agency established to manage the REACH process. ECHA will co-ordinate the substance evaluation process following receipt of the dossiers. Substances of very high concern may be subject to authorisation or restriction of use.

SVHCs

Substances of very high concern (SVHC) will include:

- Substances classified as carcinogenic, mutagenic or toxic to reproduction (CMR)
- substances with other harmful properties that meet the criteria of persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB)
- those substances that are identified as potentially causing serious effects to humans or the environment of an equivalent level of concern as those previously mentioned (e.g. endocrine disruptors).

SVHC may be identified by Member State Competent Authorities or the ECHA. The high concern substances will be included in a list of candidate substances for prioritisation (known as the 'Candidate List'). This means the substances will be prioritised to determine whether they should be subject to authorisation of use and will take into account the opinion of interested parties.

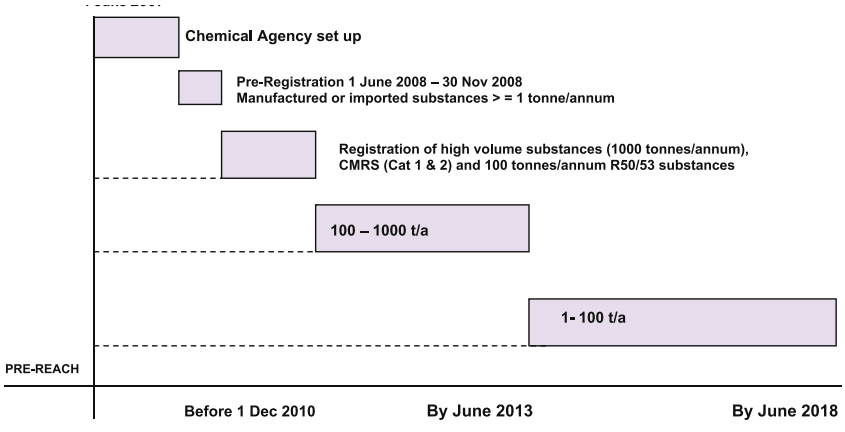
At the end of the prioritisation phase, it will be decided whether the substance will require authorisation and the date after which the substance cannot be used without authorisation. These substances will be placed in Annex XIV of REACH. The European Commission will only authorise specific uses if risks are adequately controlled and / or the socio-economic benefits outweigh the risks and there are no suitable alternative substitutes or technologies. A blanket restriction may apply to the use of a substance or to specific uses only, and this part of REACH replaces the Marketing and Use Directive (76/769/EEC).

A PHASED APPROACH

REACH is being managed in a phased approach; substances manufactured or imported at or above 1000 tonnes per annum will require registration in the first phase before 1 December 2010, along with CMR (Category 1 and 2) substances and substances manufactured or imported at or above 100 tonnes per annum, which are classified as dangerous for the aquatic environment with R50/53 risk phrases.

Substances manufactured or imported between 100 and 1000 tonnes per annum will require registration before 1 June 2013 and the lowest volume – that is, between 1 and 100 tonnes per annum – by 1 June 2018. A pre-registration phase took place from 1 June 2008 to 30 November 2008, after which time it became illegal to supply substances already on the market that have not been pre-registered, until they are subsequently fully registered.

Many of the REACH provisions apply to manufacturers and importers of chemical substances, but downstream users do have responsibilities under REACH. A downstream user may be a manufacturer of preparations, such as printing inks, or a professional user, such as a printer.



The REACH time line

However REACH is about the chemical supply chain, and knowing where substances are being used within Europe and for what purpose. Substance registration therefore involves providing details about the exposure potential and control measures for the identified uses of the substance being registered. In order to do this, registrants need sufficient information from downstream users to develop exposure-related information or exposure assessments and risk management measures

DOWNSTREAM USE

Downstream users of hazardous substances should try to ensure that their use of the chemical substance is included within the registration dossier to save further action later. If a downstream use is not included within the registration, a downstream user may still use a particular hazardous substance provided their use of the substance is covered by the exposure scenario (ES), which is a document describing the safety conditions under which substances, or substances in preparations, should be used. If smaller volumes are produced or imported by the supplier, then safety information may be provided in an alternative format.

If downstream users purchase an identical material from different suppliers, the exposure scenarios may differ and this will need to be considered, although Official Guidance recommends following the most stringent of measures. Hazardous preparation suppliers may provide an ES for the preparation or the individual constituent dangerous substances, or both. In this instance, the ES for the preparation should be used when provided.

Without an overall ES for the preparation, it will be necessary to check compliance for each substance separately. Downstream users must report uses of substances outside the conditions described by their supplier exposure scenario, and prepare their own chemical safety report, when the 1 tonne threshold is reached.

Another important role of downstream users is to communicate information up and down the supply chain, and they are favourably positioned to do so. Downstream users should communicate with suppliers if they gain relevant information on the hazardous properties of a substance or suitability of risk management measures. They should also communicate information to ECHA if they disagree with the classification and labelling of a substance, for example as a result of the preparation of a chemical safety assessment.

Downstream users of authorised substances must use the substance within the conditions of that authorisation. They may also apply themselves for authorisation for their own use, should suppliers being unwilling to do so.

THE CURRENT SITUATION

ESMA members have reported that pre-registration was a nail-biting experience – although able to verify that substances had been pre-registered following the availability of a list of pre-registered substances on the ECHA website, it was not possible to verify that particular suppliers had actually pre-registered as registrant details were not provided.

Many raw materials used in printing ink formulations are actually preparations and downstream preparation manufacturers have reported that the process of trying to obtain confirmation from further up the supply chain was fraught with difficulties and delay. In the last remaining weeks of the pre-registration phase, many downstream users were still waiting for confirmation of pre-registration from a significant proportion of suppliers.

There were, however, many reported problems with the REACH IT system during the pre-registration phase, with frequent system crashes particularly during peak hours and as traffic on the website increased towards the end of the pre-registration period. ECHA reports that there were in excess of 2.2 million pre-registrations from more than 65,000 companies in 30 European countries. ECHA also reports that it received about 15 times more pre-registrations than expected, and that half of the submissions arrived during the last three weeks of the pre-registration phase, which supports the downstream user issues reported above.

CONSTITUENTS OF RAW MATERIALS

Another difficulty for downstream manufacturers is a lack of complete awareness of the constituents in the raw materials they purchase, as the current system requires only substances that are hazardous above defined threshold values to be identified in the Safety Data Sheet. Consequently it is not actually possible to verify that all constituent substances contained within preparations, and therefore used by an organisation, have actually been pre-registered without the explicit confirmation from suppliers.

Following the pre-registration process, registrants must now organise themselves into Substance Information Exchange Forums (SIEFs) so that registrants of the same substance can share information to avoid the duplication of testing. For registrants of substances that must be registered by December 2010, there is obviously a limited time to get organised – some may have already done this through the formation of pre-SIEFs, which became a feature of pre-registration.

The practice of how a particular SIEF operates is not defined, however all SIEFs must select a Lead Registrant, which is a legal requirement of the REACH regulation. The Lead Registrant must submit the Joint Dossier containing the required registration information relating to the substance. Company-specific information is then only required by the other registrants.

Valuable lessons will be learned from the early SIEFs, but some organisational difficulties are being reported from SIEFs involving a large number of registrants, i.e. where there are a large number of manufacturers and importers of the same chemical substance.

CONDITIONS FOR SVHC NOTIFICATION

Many manufacturers, importers and downstream users will have received requests from customers regarding the presence of Candidate List materials in the products they supply. Article manufacturers must notify ECHA if their article contains a SVHC in a concentration above 0.1% wt/wt under the following conditions:

- Exposure cannot be excluded under normal conditions of use including disposal,
- the organisation uses the material above the 1 tonne per annum threshold value, and
- the substance has not already been registered for that particular use (a potential registrant or notifier should check whether the material has already been registered for the use before proceeding).

Notification typically involves submitting company details, identity of the substances, hazard classification and labelling, and a description of the use in the article. When a Candidate List substance is present in an article above 0.1%, the article manufacturer must provide the recipient of the article, or at the request of a consumer, sufficient information to enable the safe use of the material.

We will undoubtedly see more chemicals disappear from the European market as registration deadlines approach. The risks may outweigh the benefits of use, or the cost of processing them through the REACH process may outweigh profitability, particularly for small volume specialist chemicals.

Aside from the registration fee, there may be significant cost in providing the safety dataset and the base fee; an authorisation can cost up to €50,000 for larger organisations. Some would argue that this is a good thing and it is not an intention of the author to comment on this aspect of REACH, however manufacturers may find themselves having to reformulate products quickly, which is not easy to do when working to particular specifications and customer expectations. SP

Elaine Campling is ESMA's HSEP (Health, Safety & Environmental Protection) Committee Chairman and is Product Safety Manager for FUJIFILM Sericol

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DECADES OF ENVIRONMENTAL PHILOSOPHY

With Marabu celebrating its 150-year anniversary, Friedrich Goldner outlines the environmental direction the company has been taking with its product development

MARABU IS A LEADING GLOBAL MANUFACTURER OF SCREEN, DIGITAL AND PAD INKS WITH HEADQUARTERS NEAR STUTTGART, GERMANY. WITH ITS SUBSIDIARIES AND EXCLUSIVE DISTRIBUTION PARTNERS, MARABU OFFERS HIGH QUALITY PRODUCTS AND CUSTOMISED SERVICES IN MORE THAN 70 COUNTRIES.

In recent years, environmental thinking and sustainability have become important aspects of business activities. As a company within the chemical industry, Marabu is positioned to understand the particular responsibility for human nature and the environment. For existing as well as future developments in its product portfolio, the company is particularly conscious of the environmental compatibility of products and searches for the lowest health hazards possible.

The Ultraglass UVGCC UV ink series

Such responsible care applies to the development, production, application and disposal of products. By continually investing in state-of-the-art production technology, almost always exceeding legal requirements in doing so, Marabu minimises any potential environmental impact originating from the development and production of its products. To underline the importance of this environmental focus, the company has had an Environmental Manager in its quality assurance department since 1990. The company also actively participates in several working groups and associations looking at specific sustainability-related topics.

A SIGNIFICANT ANNIVERSARY

This year Marabu celebrates its 150-year anniversary, with the company having its roots in artistic paints and inks. The company chronicle mentions one of the very first screen printing ink series, called Marapid, in 1952 with a solvent combination which, at that time, was pioneering because it was not subject to any specific labelling. More recently, environmental actions have been taken in all relevant areas such as manufacturing, waste, energy use, smart ink management systems, packaging, recycling and with the company's core ink formulation following Marabu's own stringent protocol.

During the manufacturing process, all solvent emissions are processed in a thermal post-combustion unit combined with a heat recuperation system to reduce energy demands, cleaning solvents are distilled and 95% are re-used, and all water used in production is treated to a level suitable for its safe re-use. A major step forward was taken two years ago when all Marabu sites changed to exclusively using power from renewable sources, saving about 2300 tons of CO_2 emissions annually.

All packaging materials used are chosen for their recycling potential, products are offered in 230 kg lined drums with a corresponding specific drum dispensing unit to reduce waste, and smart colour management systems allow customers to precisely produce special shade quantities, thus avoiding waste.

HEAVY METAL-FREE INKS

With the complete exclusion of high risk heavy metal pigments in its products since 1994, Marabu was one of the first screen and pad printing ink manufacturers to be completely

Marabu received an environmental achievement award from SGIA in 2004

The Librastar HF is a halogen-free ink for the electronics industry

heavy metal-free. The company complies with EuPIA's exclusion list for printing inks and related products. In 2004 Marabu was rewarded for its efforts by the Specialty Graphics Imaging Association's Environmental Achievement Award. Many environmental aspects were included in the management system for its initial ISO 9001 certification in 1995, followed by the dedicated ISO 14001 certification for environmental management in 2003. In the same year, the Sony Green Partner certification was received for supplying specifically controlled inks for optical disc production; this has been renewed every second year.

Bringing environmental awareness into screen and pad printing ink design started with the creation in 1985 of the Libra family of solvent screen inks. A mild solvent combination was added to these products, resulting in a lower label classification which is beneficial for both the environment and the operators. The first product in the family was the Libragloss LIG screen series, a universal ink covering daily screen printing jobs. The mild odour of the ink combined with excellent product performance was well received by printers.

The Libraspeed LIS followed in 1993, covering the increased automated screen machinery. The Libramatt LIM series was introduced in 1997, fulfilling customers' needs for a matt ink series. Libraprint LIP, introduced in 1999, reflected the need for speed by focussing on faster drying.

NEW PRODUCTS

Last year the Libra family grew once again, this time focussing on industrial applications with the Librastar HF, previewed at the CSGIA show in Guangzhou in November 2008. Over the last few years the electronics industry has shown an increasing interest in halogen-free components, leading to a need for halogen-free printing inks. Librastar HF meets the demands of the electronics industry for using halogen-free raw materials such as PVC-free binder and unchlorinated pigments.

Librastar HF is suitable for both screen and pad printing for 1- or 2- component applications. Beyond the environmental benefits, Librastar HF fulfils the technical specifications for highly demanding applications. This completely halogen-free ink design corresponds to RoHs, the Canadian Hazardous Products act and DIN EN 71/3.

Another UV ink series, Ultraglass UVGCC, was showcased for the first time at Nutec, a new exhibition held in Frankfurt in November last year. Ultraglass UVGCC was designed under the guidance of EPEA and follows the principles of cradle-to-cradle for the technical life cycle. It is a UV ink free of heavy metals and solvents and is halogen-free. Its raw material components disintegrate without any residue.

Friedrich Goldner is Director of Marketing at Marabu

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Second varnishing machine planned

German printing company Druckhaus Mainfranken recently installed a Colibri 104 varnishing machine from Steinemann Technology and now plans to install a second machine later this year, as the high-speed system is working almost to full capacity in two-shift operation. The Colibri 104 undertakes full-flood UV varnishing and UV strip coating on sheet sizes up to 104 x 142 cm, achieving a production speed of up to 11,000 sheets per hour. The quantity of UV varnish applied is 2 g/m^2 lower than with conventional anilox roller systems, resulting in annual varnish savings and no costs for printing plates and rubber blankets.

"The points in favour of installing this varnishing machine as an alternative to inline varnishing were both its flexibility in terms of formats, and the higher gloss values achieved at comparatively low varnish application rates," explained Christoph Schleunung, Managing Partner of Druckhaus Mainfranken. SP

The Colibri 104 varnishing machine

Successful implementation of cutting technology

PlotFactory, a leading supplier of vehicle graphics and lettering, decorating tarps and covers, posters, flags and displays to the Swiss graphics industry, recently completed an order in record time thanks to its Zünd 3XL-3000. A recent order from a well-known retailer consisted of 150 fabric display banners. The 3XL can handle materials up to 3.2 metres (126 inches) wide. Once the material is loaded, the integrated camera system reads the register marks and starts cutting; an order of 150 banners can be produced in 50 minutes with one operator.

Lars Bendixen of Zünd Systemtechnik with Claudio Forchetti

"We can now accommodate larger-volume orders easily and economically without having to subcontract for dies or any other part of the production process," commented Claudio Fochetti, CEO of PlotFactory, which has also recently added Zünd's latest generation G3 L-3200 to its equipment stock. SP

Durst buys Swedish display company

The Durst Phototechnik Group has acquired the Sign & Display division within Swedish company Molander & Son. Molander Sign & Display, which focuses on equipment and supplies for large format printing, will retain its name whilst being a part of The Durst Group; Hans Molander has been appointed Managing Director and co-owner. The company will remain focused on marketing equipment and supplies for large format printing in Sweden, Norway and Finland. SP

Neschen becomes founder member of Color Alliance

Neschen has become a founder member of the Color Alliance (CA), a coalition of companies in the printing and printing supplies sector aiming to drastically reduce the number of colour profiles in large format printing based on a standardised coating, so that production processes in digital printing are simplified whilst productivity and process reliability rise. Neschen's digital printing media for water and solvent-based inks now have a standardised coating which has been tested and certified by the CA.

The basis of the CA concept is close collaboration between the leading manufacturers of printers, RIPs, media and inks. Apart from these companies, dealers, printing service providers and end-users also benefit from the co-operation as time and money costs from too many trial printouts, excessive waste and discussions with dissatisfied customers are avoided. SP

New printer reduces job time and costs

UK screen printer and sign manufacturer, Signet Signs, has installed a Gerber Solara ionx UV wide-format digital inkjet printer from Spandex. The printer combines a direct-to-substrate print capability with Cold Fire Cure technology and GerberCAT cationic UV inks, allowing the company to print onto a wide range of substrates while reducing turnaround time and material costs.

"The Cold Fire Cure technology, which cures the ink at room temperature, allows us to successfully print onto a wide variety of heat-sensitive materials including PVC fluted board brands, HIPS (high impact plastic) and polypropylene," explained Mike Rawlings, Director and General Manager of Signet Signs. "We have reduced the turn-around time of production by 50% and materials by 30%, which gives us great competitive advantage. Since its installation, we have saved thousands of pounds each month in materials. Traditionally, a screen printing job has about eight steps; with the Gerber Solara ionx, we have reduced it to three – we cut the board, print and pack." SP

Signet Signs has installed a Gerber Solara ionx printer from Spandex

Color Alliance is ready for take-off

A co-operative agreement between international RIP and printing media manufacturers has been established under the umbrella of the Color Alliance (CA). The aim of the collaboration is to simplify production processes in the field of large-format (L-XXL) inkjet printing and to boost productivity and process reliability for printing service providers, dealers, print buyers and end users. The basis includes standardised coatings which drastically reduce the number of colour profiles and ensure the colour accuracy of inkjet prints.

Color Alliance tests and certifies printing media and makes the relevant ICC (International Color Consortium) profiles available. The CA Control Tool quality assurance tool, which is integrated into the PS5 CA Edition RIP software, enables the standardised and harmonised CA printing media to achieve maximum production reliability and reproducibility. SP

CA-tested and certified media achieves the same colour quality everywhere

Name change for Qualimage

Qualimage, a total solution provider of high-performance inkjet solutions for the CAD, graphic arts and sublimation printing markets, will be known as the Digital Imaging Division of Cham Paper Group from May. The Digital Imaging Division of Cham Paper Group, marketed under the brand Qualimage, was born 10 years ago when the company began producing inkjet papers for the digital printing market.

"The name change is aimed to reflect a clearly defined service that unmistakably belongs to Cham Paper Group. This allows us to expand our product range and services within a Cham Paper Group unit, and adds further substance to our brand," explained Roger Leber, Division Manager. The team, services and products of the former Qualimage will continue unchanged. SP

Avery Dennison announces end of distribution relationship

Avery Dennison's Graphics & Reflective Products Division, a leading provider of digital media, screen print and cut vinyl products to the sign and graphics industry, has announced that its distribution relationship with Grimco will be concluding with immediate effect. This means that Grimco will not be distributing Avery Graphics' screen print and sign cut vinyls or its digital vinyl media. Avery Graphics screen print, cut vinyl and digital media will continue to be offered by Avery Graphics' network of national and regional full-line distributors throughout North America. SP

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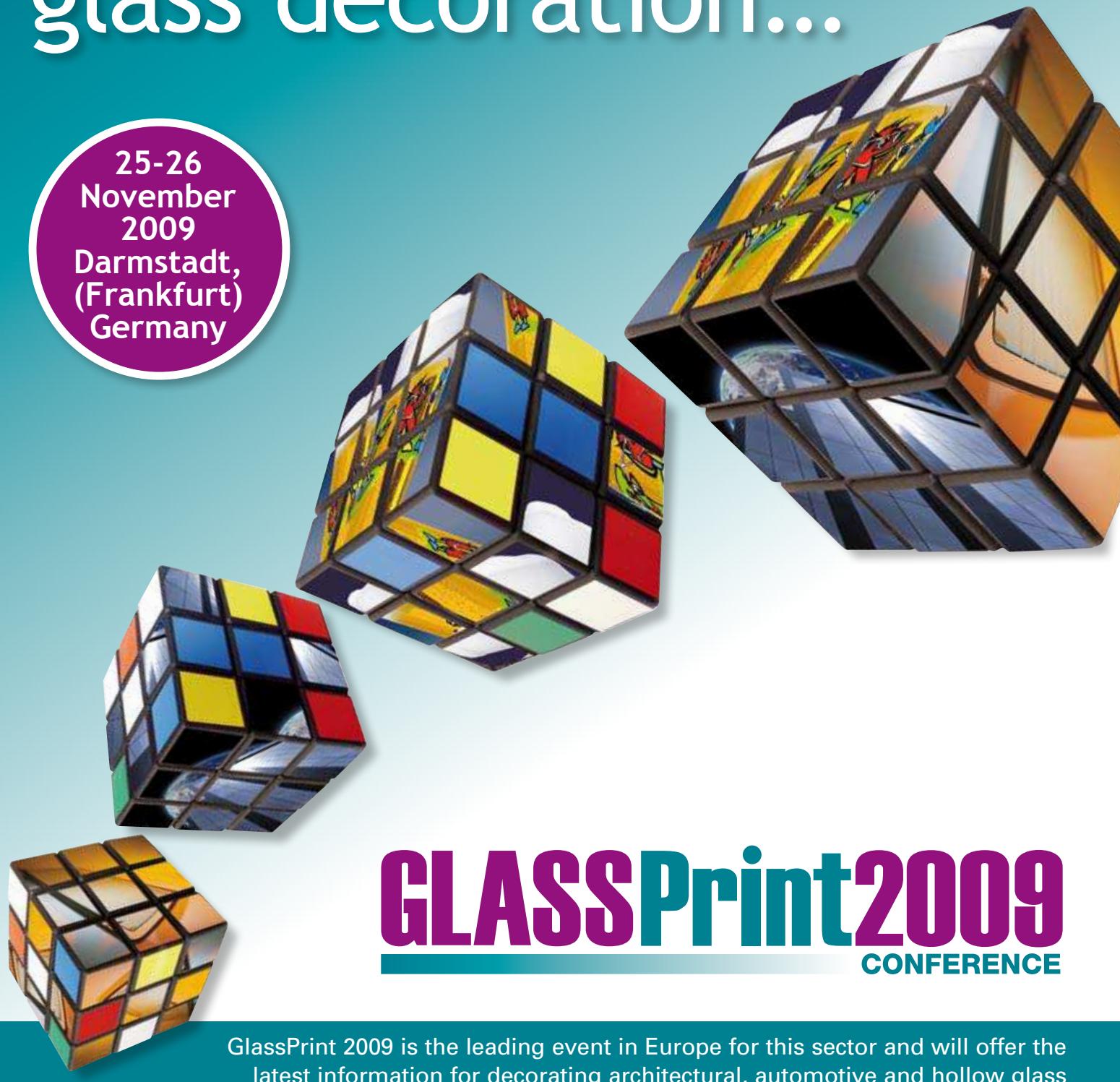

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Two new screen openers for the printing industry

Sprayway, a US aerosol chemical manufacturer, has developed a 'green' liquid screen opener and a screen opener for water-based inks for the printing industry. Sprayway No 310 Fast Dissolve Ink and Paint Remover is certified by Design for the Environment, a division of the USA's Environmental Protection Agency; the product offers reduced emissions as it does not contain any harsh chemicals, has low odour, is completely biodegradable and has no VOC content. It has been tested and proven effective on both plastisol and water-based inks and is also an excellent graffiti remover, effective in cleaning permanent marker and residual shadowing from whiteboards.

Sprayway No 32 Fast Open Screen Opener for Water-Based Inks is a low cost product for removing dried ink, improving the quality of printing and reducing cost and downtime from reclaiming the screen once ink has dried on it. This light foam spray is sprayed onto the area of dried up ink and then wiped away with a dry cloth, sponge or paper towel. It also can be used as a screen cleaner or general purpose degreaser around the shop. SP

SW310 - Sprayway No 310 Fast Dissolve Ink and Paint Remover

Sprayway No 32 Fast Open Screen Opener for Water-Based Inks

New AsPac Sales Director for Nazdar

Nazdar, a leading manufacturer of screen and digital printing inks and chemicals, has announced the appointment of Patrick Wong (Wong Ko Siong) to Nazdar Inks & Coatings as Sales Director for the Asia Pacific Region. Patrick, who will be based in Singapore, has more than 17 years of screen and digital printing experience from positions at Lam Thong Corp and Autotype International, and with his own consultancy firm.

"Patrick has an in-depth knowledge and understanding of business development throughout the Asia Pacific region, precisely meeting our current requirements in this important geographic market," commented Phil McGugan, Nazdar's Vice President of Global Sales and Marketing. SP

Multi-colour screen printing lines delivered to Bulgaria

Thieme, a leading manufacturer of flatbed screen printing machines, has developed and delivered a tri-colour line for the printing of flat glass for white goods for a Bulgarian glass processor. The recently commissioned screen printing line consists of three interlinked single-colour systems which also can be operated independently.

Trakya Cam Bulgaria specialises in the manufacture and processing of glass, printing glass for architectural and automobile industry applications through to white goods. The custom-designed new multi-colour line consists of three Thieme 3000 GS screen printing stations which are integrated into a 45-metre long fully automatic inline production line. The printing line is a configuration of proven modules and components from the Thieme product line. SP

The tri-colour line is for the printing of flat glass for white goods

FESPA DIGITAL 2009

Amsterdam, The Netherlands; 12–14 May 2009

TAKING PLACE AT THE RAI EXHIBITION CENTRE IN AMSTERDAM, FESPA DIGITAL 2009 WILL FOCUS ON MAXIMISING LEARNING OPPORTUNITIES WITH A DIGITAL INNOVATIONS SHOWCASE THEATRE PROGRAMME THAT COMPRISES 18 FREE SESSIONS HOSTED BY WORLD-LEADING AUTHORITIES FROM PRINT AND ASSOCIATED INDUSTRIES. THE SEMINARS INCLUDE TOPICS SUCH AS WINNING BUSINESS IN THE CREDIT CRUNCH, MAXIMISING PROFIT WITH INKJET, INTERWEAVING PRINT TECHNOLOGY, THE PRACTICAL ASPECTS OF OPERATING UV INKJET PRINTERS, AND THE DIFFERENCES BETWEEN DIGITAL AND TRADITIONAL PRINTING. PAUL MACHIN, SPECIALIST ADVISOR ON BEST PRACTICES TO THE EU ENVIRONMENTAL AGENCY, WILL ALSO LEAD A SESSION ON ENVIRONMENTALLY SUSTAINABLE PRINTING.

The Digital Textile Conference, 'Rising Above the World Recession', has 13 sessions covering commercial and technical topics. John Ellery, vice-chairman of FEPE, the international association of outdoor advertisers, will give the opening keynote address. Other subject areas include the progress of digital textile printing, the comparative advantages of direct and transfer printing, the environmental impact of different inks used in digital textile printing, Italy's silk and fashion printing 'hotspot', and techniques for higher reproduction quality in direct textile printing.

The RAI Exhibition Centre is located in Amsterdam's business centre and is easily accessible by public transport, with regular trains from Schiphol Airport. The conference delegate rate is €495 for members or €595 for non-members, which includes the full conference programme, evening networking drinks and dinner, and all programmed meals and social activities. Further programme and booking details are available on the website.

EXHIBITORS

ESMA / NASMA members and supporters of this magazine who will be exhibiting at FESPA Digital include:
3P InkJet Textiles AG, Agfa Graphics, Alcan Composites - Alcan Singen GmbH, Barbieri electronic snc, Bordeaux Digital Print Ink Ltd, Brother Internationale Industriemaschinen GmbH, Caldera Graphics, Cham Paper Group (Qualimage), ColorGATE Digital Output Solutions GmbH, Dataplot GmbH, Dickson Coatings, Durst Phototechnik Digital Technology GmbH, EFI VUTEk, Esko-Graphics, Encres Dubuit, Epson, Ergosoft, FUJIFILM Sericol, Gandinnovations bvba, Hewlett Packard, Ink Technologies UK Ltd, InkTec Co Ltd, Intelicoat Technologies, J-Teck3 Srl, Kala SAS, Kammann Spezialmaschinen und Steuerungstechnik GmbH, Kiian Spa, Kornit Digital Ltd, Marabu GmbH & Co KG, Mimaki Europe BV, Mutoh, Nazdar, Neschen AG, Oce Display Graphics Systems, Onyx Graphics Inc, R Tape Europe (IC), REDGiant Inc (Korea), Roland DG Benelux NV, Sawgrass Europe, Sihl Digital Imaging, SJ-D5 Inc, Sun Chemical Screen, Sun LLC, Triangle Digital INX Co, WP Digital AG, Xaar plc, Zund Systemtechnik AG.

For a full list of exhibitors, see the website.

Further information:
web: www.fespadigital.com

For exhibitors profiles that follow, all locations are Hall 1 unless otherwise indicated.

NEW OUTDOOR PAPER LINE

Cham Paper Group's new Digital Imaging Division will launch its new Exterio outdoor paper line at FESPA Digital. The range of products is suitable for outdoor applications, including special grades for mega-scrollers, light boxes and billboards. Exterio grades deliver excellent printing results combining outstanding wet-strength properties with supreme tear and flex-crack resistance. This versatile, environmentally-friendly product range offers high quality grades for eco / mild solvent, real solvent and UV curable printing. **Booth C61.**

DECORATIVE ART ON SHOW

Epson is a platinum sponsor of FESPA Digital 2009, where it will be showcasing its Micro Piezo digital inkjet printing technology for the signage, decorative art and interior design markets. On display will be the Epson Stylus Pro GS6000, a 64-inch wide format printer which uses Epson UltraChrome GS Ink, a new eco-solvent type ink. The Stylus GS6000 is a flexible production solution for multiple commercial applications which enables operators to switch easily between a range of different coated and non-coated substrates. **Booth G30.**

ECO INKS FOR DIGITAL PRINTING

J-Teck3 will demonstrate its products for the digital printing market. Dispersed inks for polyester printing are represented by the J-Eco Nano line which is free from alkylphenolethoxilate and highly compatible with the environment. Four series are available for different applications: J-Eco Subly Nano, J-Eco Flag Nano, J-Eco Print Nano and J-Eco print Nano HF. J-Eco Pigment G is for direct printing on paper and paper substrates, J-Eco Pigment T is for direct printing on polyester, cotton, viscose and silk, J-Acid is for direct printing on silk and polyamide fibres and J-Rex is for direct printing on cotton. J-Eco products meet EEC environmental standards and are compatible with digital printers equipped with piezo printing heads. **Booth A130.**

EXTENDED PRODUCT RANGE FOR DIGITAL PRINTING

Marabu will display solvent-based and UV-curing inkjet inks for wide format, super wide format and UV applications, including water-based and UV curing liquid lamination coatings being shown for the first time. In wide format, the Marajet DI-LS light solvent ink series for the Cammjet / Soljet models and the Marajet DI-CP for Seiko / HP come with a fully compatible / matching bulk system. In super wide format, Marajet DI-V covers a range of suitable equipment such as Vutek, Gandi, DGI Megajet and Keundo printers. For UV applications in graphic and industrial segments, Marabu offers a solution for rigid substrates and a new hybrid solution. **Booth G110.**

NEW PRINTER FOR HUGE PRINTS

Océ will be displaying its Arizona 350 XT, a new UV-curable flatbed printer for high quality prints. This extra-large flatbed printer has roll media and white ink options and is capable of producing rigid prints up to 2.5 x 3.05 metres (98.4 x 120 inches). Océ will also display its ProCut solution, a complete digital system that streamlines the workflow of rigid and flexible display graphics media from prepress to finishing. **Booth J70.**

A GREEN AND VERSATILE PRINTER

Sun will present its NEO UV-LED Evolution, a wide format machine for direct printing onto materials such as glass, wood, plastic, tile, mirror, leather, banners and paper. The environmentally-friendly printer uses UV-LED technology; it accepts media of 20 cm (8 inch) thickness and 100 kg weight, and comes with Konica-Minolta CMYK, LcLm and White 14 pl print heads. **Hall 7, booth P60.**

RANGE OF DIGITAL PRINTING SOLUTIONS

HP will be presenting a selection of digital printing solutions. The HP Scitex FB7500 printer delivers high print speeds and standard three-quarter automation. The HP Designjet L65500 large-format signage printer offers broad outdoor and indoor application versatility. The HP Scitex XP2300 printer is a 3.2m UV roll-to-roll press designed for the outdoor signage market, and the HP Scitex TJ8550 printer delivers higher print speeds at lower costs. **Booth C70.**

THREE NEW PRINTERS ON DISPLAY

EFI will be showing three new products. The VUTEk GS3200 3.2-metre UV hybrid printer is ideal for projects ranging from detailed photography and fine art replication to traditional banner and signage applications. The VUTEk GS5000r combines Point-of-Purchase (POP) quality with billboard production speeds, and the Rastek H650 UV combo flatbed handles a wide range of flexible and rigid materials, and prints in four colours plus optional white. **Booth A20.**

OPTIMISED PROCESSES FOR INKJET PRINTING

The Color Alliance (CA) offering for inkjet media is based on standardised coatings to reduce the number of colour profiles. 'CA certified' or 'CA approved' printing media simplify production processes and give maximum process reliability. CA printing media are manufactured and distributed by CA partners with the company making the relevant ICC (International Color Consortium) profiles available. The high-end PS5 CA Edition production tool is RIP software for LFP service providers, and the CA Control Tool is a quality assurance tool which is integrated into the PS5 CA Edition software solution. **Booths D110 and C50.**

The Zephyr UV printer

NEW WIDE-FORMAT PRINTER

Mutoh Europe will present its range of wide-format inkjet printers and cutting plotters. The new Zephyr professional wide-format UV inkjet printer is a CMYK 64-inch (165 cm) UV printer for roll-to-roll printing which can also handle rigid boards up to a thickness of 20 mm. The new high speed Viper Extreme dye sublimation printer is for transfer to fabric or rigid materials, offering top quality production output at 37 m²/h and speeds of up to 77 m²/h for high volume production. **Booths A30 and B30.**

INKJET PRINTER FOR GARMENT DECORATION

Brother will be showcasing its new GT-782 inkjet garment printer for high volume runs. The printer has independently-controlled dual platen and dual print-head modules so two garments can be printed virtually simultaneously and independently, and four additional industrial-grade print-heads for white ink applications. Also on display will be the GT-541 with its CMYK platform for small to medium-sized garment decorators. **Booth H161.**

Continued over

Eclypse Patterned Overlaminates enhance and protect graphics (pictures show before and after frost effect)

ADDING THE 'WOW' TO GRAPHICS

R Tape Corporation will display its new 75µm embossed vinyl overlaminates to protect and add dimension to digital prints, POP, graphics and displays. The Eclypse Patterned Overlaminate line adds subtle texture while protecting graphic images. Available in five new patterns: glitter, carbon fibre, linen, frost or diamond plate, these films are compatible with solvent, eco-solvent and UV inkjet prints, screen printed graphics and Lightjet continuous tone prints. R Tape will also display a wide range of application tapes and samples. **Booth B101.**

HIGH QUALITY RELIABLE INKS

Nazdar offers a wide range of solvent, aqueous and UV digital ink products for a wide selection of digital printers. Its Lyson series of digital inks are formulated to meet the exacting specifications of popular wide and grand format digital printers.
Booth A50.

Nazdar's Lyson series of digital inks

NEW PRINTER / CUTTERS INTRODUCED

Roland DG will introduce a new series of VersaCAMM printer / cutters. The VP-540i and VP-300i feature the company's Intelligent Pass Control technology for better print quality at higher print speeds. The VPi series has VersaWorks software, which features Roland's Color tool for easy spot-colour matching, variable data printing and perforated cut options. The upgraded FP-740 sublimation printer also now features Roland's Intelligent Pass Control and offers the possibility of calibration 'on the fly'. The FP-740 can be customised to meet the needs of the client.
Hall 5, Booth C150.

TOP CLASS UV DIGITAL PRINTING

WP Digital will be displaying the Virtu RR50 UV digital large-format printer, which can process a wide variety of flexible substrates of up to 5000 mm in width and in any length. This highly efficient production machine features special positioning precision due to the design of the substrate transport, high output, processing of reels up to 750 kg in weight, minimal material wear during reel change, and a sophisticated reel handling concept. All Virtu printers are equipped with safety casing and connections for cleaning the interior via extraction. **Booth E50.**

The Virtu RR50

CURABLE INKJET PRINTER

GCC will be exhibiting the new GCC StellarJET K72UV curable inkjet printer, which is available in standard CMYK plus optional Lc, Lm, White and Varnish. It can print refined details at true 720 dpi and apparent 1440 dpi with Lc, Lm added, and can print directly onto rigid and flexible substrates up to 1830 mm (72 inches) in width, and 50 mm (2 inches) in thickness. **Booth C120.**

MAKING INKS 'GREENER'

Bordeaux focuses on making inks 'greener' by reducing levels of VOCs and HAPs in them. The inks are made with an organic derivative without sacrificing fast drying times, low odour, a superior colour gamut, media versatility, excellent adhesion and outdoor durability. Bordeaux products include a variety of mild / light solvent inks for Mimaki printers, eco-solvent inks for Roland and Mutoh printers, a new UV ink for both roll-fed and flatbed UV printers, and aqueous or water-based inks. **Booth D68.**

FUTURE EVENTS

MAY 2009
5-7 SGIA Membrane Switch Symposium (Overland Park, KS, USA)
12-14 FESPA Digital Printing Europe 2009 (Amsterdam, The Netherlands)
12-16 China Print 2009 (Beijing, China)
22-24 IISS '09 India International Sign Show / DSL '09 Digital Signage & LED Expo 2009 (Mumbai, India)

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

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

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

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

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

INDEX TO ADVERTISERS

SGIA MEMBRANE SWITCH & PRINTED ELECTRONICS SYMPOSIUM

5–7 May 2009; Kansas, USA

TAKING PLACE AT THE OVERLAND PARK CONVENTION CENTER IN KANSAS IN MAY, THE NEWLY EXPANDED SGIA MEMBRANE SWITCH & PRINTED ELECTRONICS SYMPOSIUM WILL FOCUS ON THE LATEST MARKET TRENDS, PRODUCTION DEVELOPMENTS AND NEW TECHNOLOGIES AFFECTING TODAY'S MEMBRANE SWITCH AND PRINTED ELECTRONICS PROFESSIONALS. IN-DEPTH SEMINARS WILL FOCUS ON MEMBRANE SWITCH ADVANCES AND INNOVATIONS, PHOTOVOLTAIC PRODUCT MANUFACTURING, HIGH VOLUME PRINTED ELECTRONICS, MEDICAL DEVICE MANUFACTURING AND CONDUCTIVE INKS AND COATINGS.

The Symposium also features networking opportunities including a golf outing, a specialised trade show and welcome buffet. Attendees will also have the chance to take part in scheduled private tours to the premises of Nazdar and Preco in Overland Park, Kansas. For a complete overview of the Symposium, visit the website. Attendees who register by 7 April can take advantage of SGIA's discounted rate. SP

Further information:
web: www.sgia.org/events/membrane_switch/mss09/mss09_symposium.cfm

SPIRE EVENT FOCUSES ON EDUCATION

SPIRE IS A NETWORK OF CEOS AND TOP EXECUTIVES FOR THE INDUSTRY'S LEADING PRODUCERS OF RETAIL, POINT-OF-PURCHASE, OEM, TRANSIT, OUTDOOR AND SIMILAR GRAPHIC SOLUTIONS. ITS MEETING IN CABO SAN LUCAS, MEXICO IN FEBRUARY DISCUSSED VITAL ISSUES AFFECTING THE SPECIALITY IMAGING INDUSTRY, FOCUSSING ON IMPLEMENTING A BUSINESS MODEL THAT PROMOTES CUSTOMER SERVICE AND INNOVATIVE SALES PRACTICES IN A CHALLENGING ECONOMY.

Speakers presented sessions covering strategic planning initiatives for a wide range of organisations and businesses, and key ideas to help increase sales in a down market. SPIRE members also learned about the current role of sustainability in the graphics community and how to implement 'greening' initiatives into their business operations. The conference also included a panel discussion focusing on the latest digital ink technologies. SP

Further information:
web: www.sgia.org/events/spire/2009/recap.cfm

CHINA PRINT 2009

12–16 May 2009; Beijing, China

THE SEVENTH BEIJING INTERNATIONAL PRINTING TECHNOLOGY EXHIBITION, OR CHINA PRINT 2009, WILL BE HELD AT THE NEW CHINA INTERNATIONAL EXHIBITION CENTER (NCIEC) IN BEIJING IN MAY. ORGANISED BY THE PRINTING AND PRINTING EQUIPMENT INDUSTRIES ASSOCIATION OF CHINA AND THE CHINA INTERNATIONAL EXHIBITION CENTER GROUP CORPORATION, AROUND 160,000 VISITORS AND 1000 EXHIBITORS ARE PREDICTED TO ATTEND THE 120,000 SQUARE METRES SHOWCASING THE GLOBAL PRINTING INDUSTRY.

Established in 1984 and taking place every four years, China Print is now the largest printing trade fair in Asia and the third largest printing exhibition in the world after Drupa and IPEX. The Second International Forum for Printing Development will be held during the exhibition, as well as over 40 fringe conferences and seminars.

The NCIEC neighbours Beijing Capital International Airport and is surrounded by a network of roads and public transportation, such as subway, public bus, airport shuttle bus and taxi. Visitors can pre-register online for free entry. SP

Further information:
web: www.chinaprint.com.cn

LEADING INDUSTRY ASSOCIATIONS SUPPORT GLASSPRINT 2009

25–26 November 2009; Darmstadt / Frankfurt, Germany

IN RECOGNITION OF ITS IMPORTANCE ON THE GLOBAL PRINTING EVENT CALENDAR, FOUR LEADING INDUSTRY ORGANISATIONS HAVE ANNOUNCED THEIR SPONSORSHIP OF GLASSPRINT 2009 – THE LEADING EVENT IN EUROPE FOR THE DECORATION OF GLASS. THE SGIA, DGG, SGCDPRO AND GLASSGLOBAL.COM WILL BE SPONSORING THE TWO-DAY CONFERENCE AND EXHIBITION THAT WILL BE HELD IN GERMANY IN NOVEMBER. THE EVENT WILL PRESENT ANYONE INVOLVED WITH THE DECORATION OF GLASS WITH THE LATEST TRENDS AND DEVELOPMENTS.

GlassPrint 2009 will expand upon the highly successful 2007 event, which was deemed an outstanding success by the international audience of 170 glassmakers, glass decorators and leading suppliers, and will move to the spacious and easily accessible Maritim Konferenz hotel in Darmstadt (near Frankfurt).

Online registration is now available. Exhibition space is limited, so if you are a supplier to the glass decorating sector and you haven't already reserved your table-top area at GlassPrint, please call +44 1342 315032 to discuss availability. SP

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