

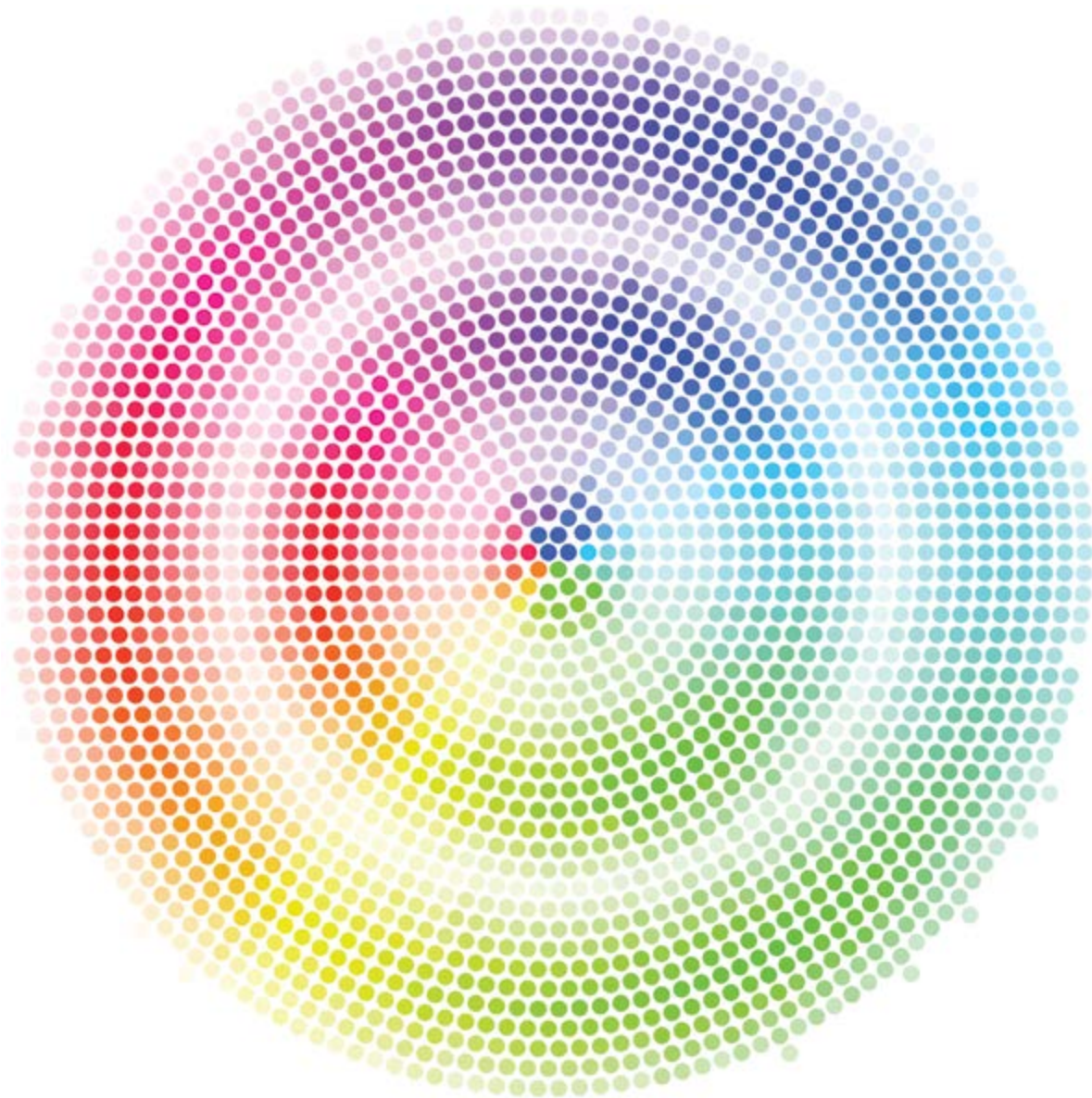
ISSUE 3

2016

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SAATI Chemicals products are developed specifically for the different industry segments: glass, textile, Computer To Screen, ceramics and high-end industrial applications. In each segment, Saati Chemicals provides superior performance, consistency and top quality print results.

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WELCOME

In the following pages of your latest issue of *Specialist Printing Worldwide*, users of screen and wide format digital systems can benefit from need-to-know technical content covering a broad range of topics specially compiled to assist with day-to-day operations.

Alongside our educational content, many innovations from drupa 2016 are covered, including insight overleaf from my colleague Sophie Matthews-Paul and an event review starting on page 54. Members of our team were present throughout drupa and having reported significant strides in digital and screen-printing alike, we are already wondering about new developments that will be unveiled at the SGIA Expo, IJC, InPrint and autumn FESPA and ISS events, as well as other vertical exhibitions such as glasstec and the K-Show. We'll be on all those show floors and look forward to meeting readers and advertisers alike.

Coupled with the technical know-how on offer at trade events, subscribing to future issues of *Specialist Printing Worldwide* at www.specialistprinting.com will ensure that you are completely up-to-date with the latest technological advances throughout the industrial, graphic and textile sectors, wherever you are in the world. After reviewing the content in this issue, I'm confident you'll agree that an annual subscription of only €58 / \$84 / £48 represents excellent value for money! Our existing subscribers consistently tell us that *Specialist Printing Worldwide* is essential reading for them.

In addition, if you're a manufacturer of machinery, equipment, software or consumables interested in promoting your solutions to existing and potential customers through our regional and global platform, please don't hesitate to get in touch!

Finally, glass decoration continues to be a fast growing sector and those already active or looking to get involved can now register interest in the GlassPrint 2017 Conference at www.glassprint.org and request a free sample copy of our sister journal, *Glass Worldwide* at www.glassworldwide.co.uk. Happy reading!

Bryan Collings, Publishing Director, Specialist Printing Worldwide



Bryan Collings

A PLATFORM FOR CONSOLIDATION

Potential joins forces with reality in line with technology growth



Annoyingly, this year I was forced to miss my usual visit to drupa (for the first time since 1982) but, despite being absent from the Messe Düsseldorf, I was able to keep

up with launches and events without having to leave my desk. For a few years, in common with many people, I had been making my own predictions relating to the directions the show would take in order to accommodate more disparate audiences and, reassuringly for me, what I thought would happen actually occurred.

With my primary interests being in the digital and screen-printing segments I was able to follow the key announcements from an impartial distance and, in many ways, this removed me from the inevitable hype. It also gave me the opportunity to absorb what some of the smaller manufacturers were bringing to the show and give them parallel attention – not always easy when you're on site.

The key drivers that I had been brazen enough to predict highlighted packaging in the wide-format segment, greater versatility across functional print and, finally, end-to-end workflow. Inside all these are myriad components which go to make up a finished system, whether this is hardware or software. But purchasers are really only interested in the finished product with many not particularly concerned about its heritage



Durst's Rho 130 SPC single-pass corrugated packaging printer was launched at drupa 2016

and how it came to evolve to meet their production needs. It is the experience and in-depth knowledge that allows manufacturers to develop onward their products and, even if they are announced as being "brand new", what lies inside is normally based on decades of research and development plus base technologies that are already in use in the market, albeit for a different purpose.

PACKAGING POTENTIAL

The inevitability of bringing packaging options to the digital sector has been a natural progression, firstly from the use of rigid sheets for display purposes and, secondly, from the ability to work with corrugateds. The principles can be allied to the production of FDUs and other point-of-purchase applications, and the commonality in packaging extends beyond the print process itself through to cutting, folding and creasing.

The million-dollar question in the packaging sector lies not so much with the efficacy of ink-jet, well proven when proofing and prototyping are generated, but more in the physical cost of complete production, particularly on higher volumes. The digital value is added when criteria are required but cannot be produced economically using analogue presses, with variable data and the growth of versioned shorter runs for "specials" making ink-jet the only viable option. Thus, with brands demanding greater levels of customisation along with just-in-time demand and the trend for lower SKUs, a shift away from conventional production methods can now be satisfied more easily.

FUNCTIONAL OPPORTUNITIES

Although the current trend veers towards the use of digital print, screen-printing is still a very strong contender for many functional and industrial applications and the two technologies can sit side-by-side rather than be in competition with one another. This marriage is one that many might not have considered but, in the manufacturing sector, the presence of both methodologies can bring out the best of both worlds.

This year's drupa was the first that really concentrated on this segment of print, its validity and importance in industrial markets, and the potential that is due to be untapped as the world wakes up to the opportunities

available across myriad functional requirements. Because the event isn't specialised, major manufacturers and printers alike were able to gain an insight into this important arena at an all-round exhibition and the value of this cannot be ignored.

WORK-FLOW RELEVANCE

Although software in its many guises has featured throughout the decades, perhaps this year was the first where the relevance of integration and the efficiency of end-to-end work-flow really came to the fore. Developers continue to compete, of course, with their colour management, RIP, MIS and other administrative solutions; but it is now becoming increasingly obvious that many of these businesses need to have an "open door" approach.

Systems need to be able to communicate with one another in order to encourage efficiency, so job progress from the digital front-end right the way through to final finishing processes should be able to interrelate. Added to this, and encouraged by the growth of web-to-print and on-line ordering, administrative tasks should be seamless where possible, not only for speed but also to remove the chance of human error along the way.

These three areas were certainly key amongst trends at drupa 2016 although, of course, other technologies and processes were also introduced. Confirming the four-year cycle will enable more specialist events to provide a platform for the different arenas now covered by print, and exhibitors and visitors alike will be able to congregate after a sensible span of time and consolidate their particular areas of expertise on a common platform that is open to all. ■



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

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THE IMPORTANCE OF DIRECT-TO-SCREEN AND DENSITY

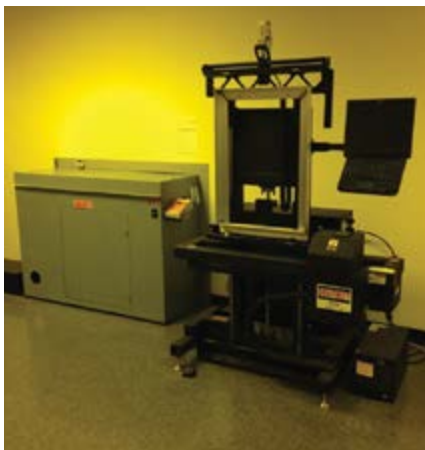
David Makin simplifies the technology choices

Direct-to-screen is one of the most exciting and greatest innovations in the screen-printing industry today. Many choices abound with several manufacturers using different types of technologies to put an image on the screen. Of the choices available, ink-jet and wax-jet use consumables – DLE (digital light engraver) uses light and no consumables. The purpose of this article is to help you make an informed decision so that you purchase what is right for your company.

Direct to screen (DTS) eliminates the use of film positives and the problems associated with films. Screens are prepared by applying emulsion to the mesh and letting it dry. But, rather than taping a piece of imaged film on the screen and vacuuming it to the glass, a screen is simply placed onto a DTS platform designed for the frame size and held into position. Then either an ink-jet print-head with a UV blocking fluid or an opaque wax is applied directly to the emulsion then sat in front of a light source and exposed without any vacuum. Rinse out is the same as with film process.

DTS SYSTEM ADVANTAGES

Printers who move to a DTS system notice advantages right away including reduced pinholes, faster exposures and greater detail with some units. Press set up time is cut about in half, exposure times are cut by about 40%, there is no more film handling or storage, and problems related to poor quality film positives are non-existent. Indeed, the move to DTS is one that can pay for itself quickly.



One pass through Novac in the wall between the yellow room and wet room for developing saves a lot of steps – one Nova can easily do 500 screens per day and keeps the unit free to start the next image

In deciding which of the DTS technologies to consider, I'd like to discuss specifically the importance of density. DTS can be so exciting that you may forget to ask the important questions that must be considered if you are to be happy with your purchase. One of the most overlooked questions is density. For printers using films, they understand the importance of a good film positive to produce a quality screen. Vellum film may work well for single colour or block art prints, but one would struggle with this type of positive if producing halftones or multi colour artwork with tight registration and fine detail. A high quality transparency would be required to produce such work with a quality result. So it is with Direct to screen.

I mentioned above three types of DTS. First, DLE (digital light engravers) which is a technology that uses a scrolling light to expose the image without using any consumables (still need to coat the screen). These units are very expensive and require very fast exposing emulsions. The detail they are capable of is second to none, but they are slower because they have to expose all of the emulsion across the screen. This is definitely an exciting technology, but cost and time usually eliminate it from serious consideration.

WHERE INK-JET CAN'T GO

Next, wax-jet is a highly opaque technology which requires a wax ink to be heated and then applied through a head with about 256 nozzles. It is fast, very opaque and capable of producing some of the most difficult details where ink-jet can't go. Wax when applied to the screen returns to a solid state resulting in a precise dot and sharp edge. Detail is consistent and repeatable. Screens can be properly exposed because wax has the opacity to prevent UV light from getting through which allows the light source to fully expose the stencil making a durable, quality screen to go to press and last.

Thirdly, ink-jet is a technology quite common in the industry as it's sufficient to meet the need, but underexposure is a common place issue when using this technology. Ink-jet uses a UV blocking fluid which inhibits the UV light from exposing the image; however, this UV blocking fluid is not as opaque as wax, so a proper exposure will penetrate the ink and start to expose the blocked emulsion which will cause loss of detail and quality. Under exposed screens create problems in other areas of production such as on-press durability is weakened, and reclaim is more difficult and time consuming

Continued over



Novac's pass-through exposure unit means there is no double handling of screens

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because of the difficulties associated with underexposure. Ink is a liquid before and after it is applied and will splatter when applied, then wick (spread) into the emulsion creating unwanted dot gain as it does. This can be controlled by adjusting a tonal compression curve in the RIP software, but still will not match the quality of a wax-jet printer. Ink-jets can be really fast, but at a cost to quality somewhere down the line. Several printers with ink-jet machines are happy with the overall performance and benefits of their machine, but many of those same printers also revert back to high quality film positives for the top 20% of their work as they need better dots and details which the ink-jet can't currently give them. I have yet to find a company with a wax-jet printer that needs to do this.

FOOTPRINT AND ENVIRONMENTAL CONDITIONS

How much room does a DTS require? Shops need to consider the footprint and environmental conditions when deciding on a DTS. Ink-jet machines all require a much larger foot print because of the ink – it has to be printed horizontally because of the print-head and this requires a much bigger footprint. Wax-jet uses electrical pulses to an industrial print-head to apply the wax ink through its print-head, so wax units print in the vertical position which requires significantly less room. Typically two wax-jet units can sit where one ink-jet unit would go giving businesses the option to have a back-up unit if needed or increased production capabilities for future growth. Environmental room conditions are strongly encouraged and sometimes required for performance of ink-jets so they don't dry out or have static issues in the print. Wax-jet units can go just about anywhere in the screen room, but not where water can get on them.

Do I need to change emulsions? With DLE – yes; with wax-jet – no and, with ink-jet – possibly. If you're happy with your current emulsion and don't want to change, then wax is the way to go. If you want to go with ink-jet, then you need to consider if your emulsion is compatible with the ink from the ink-jet machine. Not all emulsions will work with ink-jet. There is a compatibility issue to consider. It's surface tension versus surface energy. To help understand what this is, think about waxing a car. Before waxing, rain would spread over the car; after waxing, rain will bead up and run off. Waxing lowers the surface energy of the car to make it lower than the surface tension of the rain. This same concept is necessary to understand with ink-jet. Most dual cures are capable of working with ink-jet, but printers wouldn't have the advantage of the speed the DTS promotes, especially those ink-jet machines with built in curing lights. Pure photopolymers are fast, but have different surface energies which may or may not be

compatible with the surface tension of the ink used in the DTS. The wrong emulsion will cause the ink to repel and look distressed. There are a handful of photopolymer emulsions that are fast enough, but have the right surface energy for ink-jet. Then we deal again with density or opacity of the ink. A faster emulsion can be cured through the ink as it's not dense enough to protect the image.

EXPOSURE CONSIDERATIONS

Exposure is also something that needs to be considered. Understanding lights can help with your decision. For years, metal halide lights have been the industry standard because they cover the wavelengths necessary for the different types of emulsions; typically a range of 360nm through 420nm would expose most emulsions. Today, LEDs are making a big presence in the industry. They are cheap to run and don't generate much heat like metal halide. They are dialled into a specific wavelength rather than having the range metal halide offers. Wax again is opaque and not affected by these lights but ink-jet, being less opaque or dense, is affected. The wavelength gets shorter as the number goes down, and longer as the number goes up. A higher wavelength has better ability to penetrate deeper into the emulsion to assure a proper cure through the emulsion. A shorter wavelength may not be able to penetrate deep enough to cure the inside of the emulsion

properly which can cause breakdown at the press due to poor exposure. Companies promoting ink-jet technology like to use a 385nm for exposure which is sufficient for exposure without much penetration through the ink. Post exposure in the sun or a higher wavelength would be recommended to get better durability after the screen is developed and dried. This 385nm is less likely to penetrate the ink and helps to produce better quality, but the stencil will be weaker.

What are replacement costs when a print-head goes bad? Typically a wax-jet head, if it needs replacement, will cost around \$4,500.00. An ink-jet head will be around \$1,500.00 to \$2,000.00. Both print-heads are capable of producing screens for years. Some wax-jet machines have a tendency to use at least one print-head per year and other wax-jet machines have been going for more than five years on the same print-head. It's a matter of the manufacturer you choose for your wax unit. Some units have bells and whistles which require more power, which can short out some of those print-heads. Some wax jet units are simplified and meant to be a workhorse in the screen room with little issue to worry about. Ink-jets and wax-jets alike can last if those working with the units really care about the condition of the screens they put in them. Both print close to the emulsion and a screen with tape or tears in the fabric could brush the print-heads causing damage.

Douthitt's CTS 30 wax-jet computer-to-screen imaging unit has the best track record and highest quality



SPEED AND QUALITY

How fast is a DTS? Some ink-jet printers can print and expose in less than a minute, while others can print higher detail, but slow down to do so. This can be as long as five to eight minutes per screen to image it. Wax machines also have options as speed is something everyone appreciates and desires. Some wax-jets tout bi-directional printing, which can increase speed, but quality will suffer. Density also suffers with wax in a bi-directional print as the print-heads can't fill fast enough for each pass. Wax-jets pass over the same image six times to get proper opacity. If using a wax-jet in a bi-directional mode, the head can't refill with ink fast enough and, as a result, will only print where the head is filled, thus the top of the 256 jets will be less dense than the lower jets. Wax works best with uni-directional printing as well as producing the best quality. Ink-jets have both options available also. Typically bi-directional is meant for speed and general art, not detail. To produce detail, you should print in a uni-directional method. Most wax-jets will produce a screen in about one to one-and-a-half minutes which is plenty fast.

In summary, with wax-jet units, you get opacity, speed, consistency, and don't have to change your emulsion. With ink-jet units being promoted so strongly, you really need to do your research and be willing to make the

changes necessary to obtain the results you'd like. I come across many shops that have purchased ink-jet and really like it, but are frustrated with the struggles that go along with them. They will say: "For what we do, it works for us." However, there is someone out there who has done their due diligence and won't settle with "for what we do".

I've been able to go into many shops that have both technologies side by side. We've produced the same image from both machines onto one screen. I've developed the wax and ink at the same time in one of the machines that prints and exposes, first by printing half on the wax machine, then the other half with the ink-jet, then allowing the ink-jet machine to expose the emulsion. After wash out, both images looked good but, at the press, the wax-jet image was by far superior. It was because of the density as much more detail was held with the wax-jet. We had speed, quality and consistency with the wax-jet that the ink-jet just wasn't delivering. I've also done the same test, but letting a metal halide expose the screen, and again the same conclusion, the metal halide improved both, with significant improvement on the ink-jet print.

There is a place in the industry for both types of DTS, but I encourage you to do your due diligence and test screens produced from both technologies. Some manufacturers will

offer performance guarantees, or even print some test screens for you to run. I'd encourage you to try this before purchasing as I'm sure you'll see, as I've found out, that density can't be overlooked. The prints from an opaque stencil are visibly a better quality.

Once at an open house where direct to screen was the subject, ink-jet print machines and wax-jet print machines were present and producing screens. The owners from Integriteez of Tulsa were there to purchase a DTS unit and were able to compare side-by-side the screens of ink versus wax. Their conclusion was: "There's no comparison." They chose what gave them the best quality, speed and consistency – they chose the wax-jet unit. ■

David Makin works in Technical Sales at SAATI

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SOLVING PROBLEMS IN THE REAL WORLD

Professor Steven Abbott continues his series relating to typical screen faults

In this third extract from the 'How to be a great Screen printer' e-book produced by MacDermid Autotype, Professor Steven Abbott takes a look at a selection of typical screen faults that can occur during screen-printing.

Over the years we've built up a large number of case studies of problems found in the real world. Here we share some of our experiences of the things that have caused screen printers real problems, and the solutions we have found. These faults are listed in no particular order and we're sure you may just recognise some of them.

REDUCING CONTAMINATION

Dirt and contamination from a number of sources can mess up your print in many ways. Dirt on the mesh during coating can cause streaks. Dirt on the film positive or on the stencil during exposure can cause pinholes. Dirt during printing gives pinholes and streaks. It is not surprising then that the highest quality industrial screen- printers do their work in clean rooms. It's amazing how much easier life is when you don't have to fight with dirt. If you don't have the luxury of a clean room then here are ten tips we've found make a real difference.

- 1 Install a simple filter in the water supply used for your stencils and meshes – and remember to change it regularly. It costs pennies yet can save large amounts of money in avoidable rework.
- 2 Clean all surfaces and floors, with a damp cloth or a vacuum cleaner that is fitted with a HEPA filtered exhaust.
- 3 Keep doors and windows closed whilst ensuring correct local exhaust ventilation (LEV) around printing machines and cleaning equipment. If adding an additional enclosure, take care that air movement into the area is from a clean source. For instance, shutting the door will be a waste of time if the air is then going to be pulled from a dirty air space above ceiling tiles.
- 4 People are the biggest source of dust, so ensure that you minimise the number of people moving around in the area. Use tack mats to minimise dust and dirt entering the screen-printing area.
- 5 Use lint free wipes for cleaning to prevent creating more dust.
- 6 Avoid fibrous packaging. Sheets should be removed from the transit box prior to



Excellent results can be achieved with both manual and automatic coating

use. Card and paper should be kept away from the printing area if possible.

- 7 Raise the humidity (this reduces static). But remember if you dampen down the floors, take care to avoid slip hazards.
- 8 Wear proper clean room overalls.
- 9 Filter air conditioning. If you turn off air conditioning on the days when it is not necessary, make sure that the alternative source of air is not dust laden.
- 10 Use an ionising air-gun to clean your mesh. An ordinary air-gun can create static (the movement of air alone will

create static that can be measured) and attract dirt back onto the mesh. The ionising air-gun gives a really clean result.

STATIC CONTROL

Static causes dust to be attracted to surfaces and is produced in three ways:

- 1 Separation
- 2 Friction
- 3 Induction

The simple act of removing a sheet of film from a stack, or passing a film through a rubber nip-roller produces static by separation and friction.



Consistent pressure is more important than absolute pressure



Figure 1 – the pressure from the squeegee might be low and acceptable in the middle of the mesh, but will be higher as the squeegee gets closer to the edge of the frame



Figure 2 – the squeegee gets distorted near the edge and does not perform well at scraping off the excess ink, thereby giving a higher ink deposit in these areas

Static is hard to eliminate once it has been produced, so the best thing to do is to reduce the chances of creating it in the first place.

An environment with a relative humidity greater than 50% always helps. Reduce the amount of film handling and the number of rubber nip-rollers to a minimum. Then make sure you have antistatic devices at critical positions. An ionising air-gun is useful for spot work (especially for the final cleaning of a screen) and an ionising air-system installed on a press keeps this critical area static free. Although 'Christmas tinsel' does a reasonable job of removing static, it doesn't look too professional and easily breaks into small lengths. Modern antistatic bungee cords are a better alternative.

THE WRONG MESH

It is surprising that some printers still choose the wrong mesh for high quality screen-printing. The most common error is to use white mesh, then complain about the lack of resolution/screen life. Next is the inappropriate choice of mesh type, count or diameter. If the print contains a lot of fine detail, then the rule-of-thumb is '2.5 x the thread diameter is the minimum size of a printable line'; this will get you fairly close to the right answer. Refer to the mesh manufacturers' data for thread diameter information.

If critical sheet-to-sheet registration is the main requirement, then stainless steel or specialised liquid-crystal polymer meshes are your most likely choices, as polyester simply does not have sufficient long-term stability.

For demanding fine-line industrial printing, the best choice is the finest stainless steel mesh you can handle.

The other aspect of mesh choice is more subtle. For example you must also take into consideration mesh moiré if you are printing half-tone images. We also have a section on moiré in the 'How to be a great Screen printer' e-book that can help you find the right mesh-count for your four-colour settings, visit macdermid.com/autotype.

IMAGE TOO CLOSE TO THE FRAME

If you have a few mm snap-off (off-contact distance), the pressure from the squeegee needed to force the mesh into contact with the substrate might be low and acceptable in the middle of the mesh, but will be higher as the squeegee gets closer to the edge of the frame (Figure 1). This comes from simple geometry. It's therefore important to make sure your image area is not too close to the frame, both in the print and crosswise directions.

So what does happen if you get too close to the frame? Firstly, you get large image distortion. Secondly, you are forced to use a higher squeegee pressure which reduces the screen life, damages the squeegee, causes judder and gives extra dot gain in graphics printing or positive sawtoothing with technical applications.

There is also evidence that the squeegee gets distorted near the edge and does not perform well at scraping off the excess ink, thereby giving a higher ink deposit in these areas. Of course, as you

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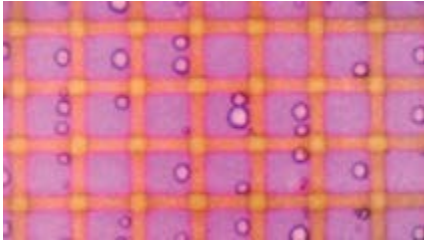


Image demonstrating trapped air bubbles

reduce snap-off distance the problems become less, so you can go to a larger image size for the same frame size (Figure 2).

POOR CLEANING

We all know that failure to properly clean and reclaim a mesh can give you a ghost image in the print. However, under microscopic examination of the mesh you can barely see this ghost image, so how can it have an effect on the print? The answer is, that the knuckles of the mesh are where most of the ghosts hide out. But why is this important? Because the amount of ink held in the mesh, and the amount of ink remaining in the mesh when it is deposited on the substrate, depends strongly on the knuckles. A small amount of ghost, hiding in the corner of a knuckle, is enough to change the printed ink volume. There is a whole section on mesh marking in the e-book that explains this further. The simple remedy is to use a haze remover to remove all the ghost images.

EMULSION COATING

Manual or automatic coating: Excellent results can be achieved with both manual and automatic coating; however, automatic coating machines typically allow a greater degree of consistency than manual coating. Coating machines are of particular benefit when processing very large screens, or where the screens are all the same size.

Coating trough selection: Selecting and then maintaining the coating trough is critically important for achieving a quality result. Troughs are available with either a sharp or round edge profile depending on what deposit is required. A sharp edge trough will deposit significantly less emulsion per coat than a round edge trough. The coating edge of the trough must be inspected regularly for any nicks or profile irregularities and replaced if damaged.

Coating techniques: Coating pressure, angle, speed and amount of emulsion in the coating trough will all affect the amount of emulsion that is deposited with each pass.

Below is an overview of each technique:

Pressure: A consistent pressure is actually more important than absolute pressure. Use sufficient pressure to ensure that the trough edge is in perfect contact with the mesh and that this contact is maintained throughout the stroke. The pressure may have to be

increased slightly when using a high viscosity emulsion, to prevent it 'pooling' in the centre of the screen. A mesh deflection of 1 to 3mm at the trough edge is fairly typical depending on emulsion viscosity.

Angle: Typically an angle of 15 to 30 degrees from the horizontal is used. Once again, maintaining a consistent angle is the most important factor. Many troughs have the end caps pre-cut to the appropriate angle.

Speed: Always try to coat as slowly as possible as this will help minimise the amount of air trapped in the mesh openings. The coarser the mesh and the thicker the emulsion, the slower you need to coat. However, if you manually coat slowly, be careful not to introduce judder lines across the mesh. This picture shows air trapped during coating. As a rough guide, speeds can range from 80 to 300cm/minute depending on the viscosity of the emulsion.

Did you know that quite small variations in the depth of the emulsion in the coating trough can have a significant impact on the coating thickness? Where coating thickness is critical, eg four-colour half-tone printing, ensure that the troughs are always filled to the same depth for each screen in the set.

Always wipe the coating edge clean immediately after coating.

Coating Regime: The number of coats you apply and the application technique used are the best way to control the stencil Rz and EOM (emulsion over mesh). For most screen-printing applications the objective is to produce a screen that has a thin, flat stencil surface on the print side, with just a thin, fully cured layer of emulsion on the squeegee side. Stencil build comes primarily from applying multiple wet coats from the squeegee side, whilst stencil smoothness comes from applying thin, face-coats of emulsion to the print side.

The typical coating regime for manual coating is to apply one or two base coats of emulsion to the print side of the screen which 'fills' the mesh and then immediately apply one or two coats to the squeegee side. This pushes the wet emulsion back through the mesh to the print side, leaving only a thin, sealing layer on the squeegee side. With coating machines you have the capability to coat both sides with each pass; this is a very effective method, however, ensure that the final pass for the base coat is always from the squeegee side.

There are obviously many variations to this theme depending on frame size, mesh count, image requirements etc. but the principal requirement is to start on the print side and finish on the squeegee side.

Face-coats: All emulsions lose volume during drying as the water evaporates and consequently they shrink back around the mesh fibres to leave an uneven surface. Face-coating is used to fill in these hollows in the uneven emulsion surface on the print side, to

create a flat stencil surface (low Rz) which minimises sawtooth during printing. Face-coating can only be applied to screens that have already been fully dried. Typically two face-coats are applied and then the screen is dried again. If an even lower Rz is required, then additional face-coats can be applied. Some coating machines are fitted with IR (infrared) dryers which facilitate intermediate drying and allow face-coats to be applied as part of a continuous production process.

For high specification applications, a sharp edged trough can be used in conjunction with a round edge trough. Use the round edge trough for the base layer and the sharp edge trough for the wet-on-dry face-coats. This reduces the surface roughness (Rz) without significantly increasing the stencil profile (EOM).

DRYING OF STENCILS

Did you know that drying the emulsion after coating is just as important as exposure when it comes to screen life? A poorly dried screen will be easily damaged during printing as its solvent and mechanical resistance has been dramatically reduced.

The theory of drying says that: "air flow is usually more important than mere temperature." Just think of the difference of drying your hair with a cool hair dryer (plenty of air flow but little heat) and with an electric heater (plenty of heat but little air flow). The hair dryer wins every time. A hot box stuffed with wet screens is a sure fire way to get breakdown on the press as the warm moist air simply won't dry the screens enough. And remember that overheating the stencil will cause it to fuse and give poor reclaim.

A quick tip to help with a poor screen drying setup is to install a de-humidifier in the system. You can then turn that 'hot box' into an efficient and effective dryer and you will be amazed at just how much water even a small de-humidifier can pull out of the air.

We hope that you enjoyed this selection of some of the screen-printing faults featured in the 'How to be a great Screen printer' e-book and maybe it has sparked a couple of ideas on how to resolve some of your own problems.

If you want more helpful advice from the technical team at MacDermid Autotype the 'How to be a great Screen printer' e-book is downloadable from macdermid.com/autotype. ■

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

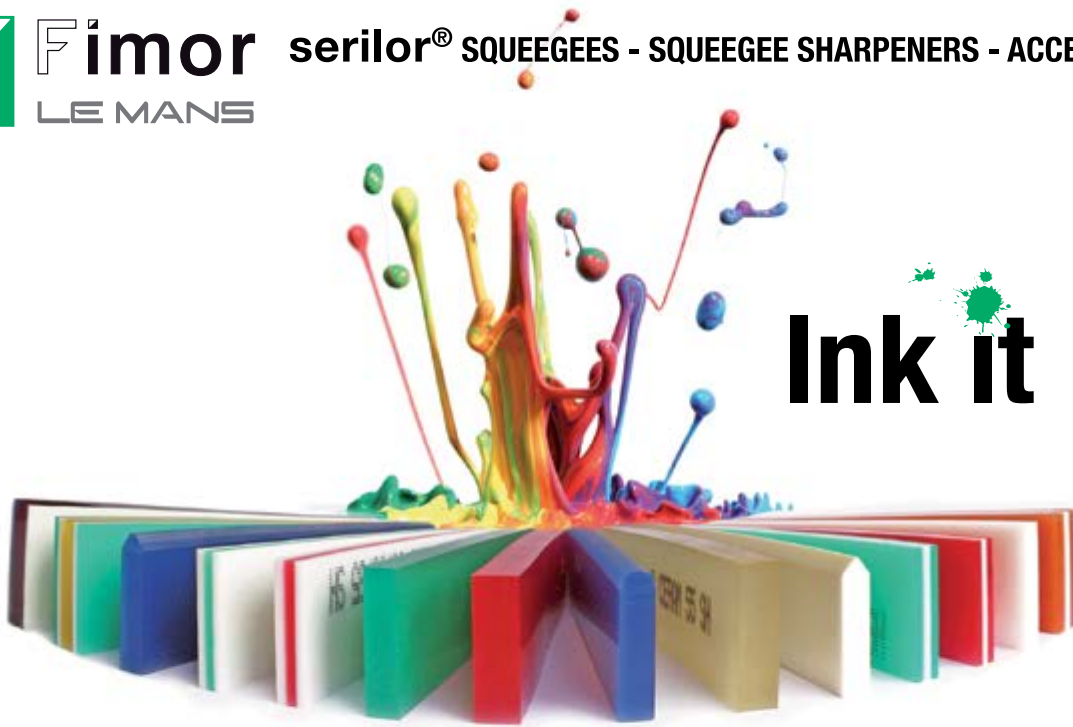
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ADVANCES IN STENCIL-MAKING

Ross Balfour explains the relationship between photopolymer and LED exposure

There are two technologies currently trending in the practice of stencil making for screen-printing. First is the increasingly popular use of photopolymer emulsions to replace two-part products. There are many reasons for this switch over, with the main benefits being the faster exposure speed and longer shelf life of photopolymer products. The second trend is a rapid conversion towards using LEDs to perform screen exposure. Anyone who has attended a screen-printing exhibition recently can attest to the rapid proliferation of LED exposure systems on display.

The purpose of this article is to outline the working relationship between PVA-SBQ polymer, the raw material used for manufacturing photopolymer stencil materials, together with the type of LED light that is required to expose these stencils (curing and imaging), in order to guarantee optimum results.

PVA-SBQ polymer, aka photopolymer is a modified form of polyvinyl alcohol, aka PVA. PVA polymer is an essential component of all direct stencil materials, because of a unique combination of three properties. First, it is water soluble, so that emulsions are water based and stencil developing can also be performed with water. Secondly, PVA is very solvent resistant, unlike most other water soluble polymers that are even more soluble in solvents than in water. Thirdly, it contains a glitch in the polymer chain, as a normal result of the manufacturing process. This allows stencils to be broken down and screens easily reclaimed, under mild conditions, using water based reclaiming solutions.

PVA-SBQ Polymer Chain [1]

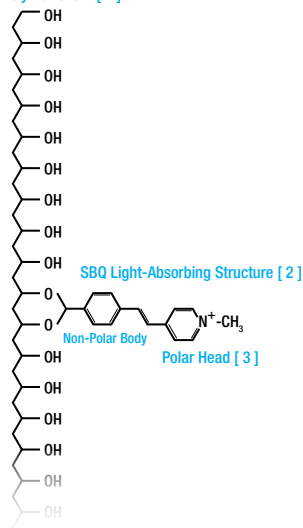


Figure 1: PVA-SBQ polymer chain

PVA'S UNIVERSAL USAGE

PVA is used universally in all direct emulsions and capillary films, and many different grades are available. This allows manufacturers a high degree of flexibility to modify technical properties for a wide range of emulsions.

To convert PVA to PVA-SBQ, the PVA polymer is modified by attaching cross-linkable SBQ molecules to the polymer chains. Each attached molecule contains a chromophore. This is a dye-like structure that renders the PVA-SBQ polymer light sensitive. This group also performs double-duty, by being able to react and cross-link the polymer during exposure. The level of SBQ addition onto the PVA is quite low, normally only 1 to 2% substitution of the PVA groups. In this case, the final PVA-SBQ polymer retains all of the desirable properties of the original PVA, including water solubility, solvent resistance and ease of reclaiming.

See Figure 1 for an illustration of PVA-SBQ polymer with the essential parts highlighted.

- 1) PVA-SBQ polymer chain – retains original technical & chemical properties of PVA
- 2) SBQ photo-sensitiser – light sensitive crosslinking group
- 3) Hydrophobic (non-polar) body joined to hydrophilic (polar) head – similar structure and properties as a surfactant.

The PVA-SBQ polymer is very light sensitive, even at low levels of SBQ content, because of the surfactant-like structure of the light sensitive groups that enables them to associate with one another. After coating and during drying, when the liquid emulsion produces a dried film on the mesh, isolated SBQ groups are able to seek and

find each other. The alignment that results is shown in Figure 2.

This fortuitous arrangement enables two adjacent groups to be perfectly placed, then react quickly on exposure to crosslink the polymer, as shown in Figure 3.

VARYING THE FORMULATION OF EMULSIONS

This ideal alignment scenario occurs only for a proportion of the attached cross-linking groups, but it's enough to allow the preparation of fast exposing stencils that have good cross link density. By varying the formulation of emulsions, manufacturers have the ability to produce a wide range of products. These photopolymer emulsions enable stencils to be prepared and printed, and used as robust replacements for older two part diazo and dual-cure products in all industry segments, including textile as well as industrial and display graphics.

The light absorbing properties of the PVA-SBQ play a major role in determining thorough curing of stencils. Typical screen-printing stencils range from several tens of microns total thickness, up to several hundred microns, depending on the mesh count used and the coating sequence. Total thickness includes the EOM (emulsion over mesh), or stencil profile, plus the emulsion that's embedded and encapsulates the mesh, to provide both adhesion during developing, and durability during printing. The stencil exposure process is about more than just simply defining the image to be printed. It must also be optimised to ensure thorough curing of the

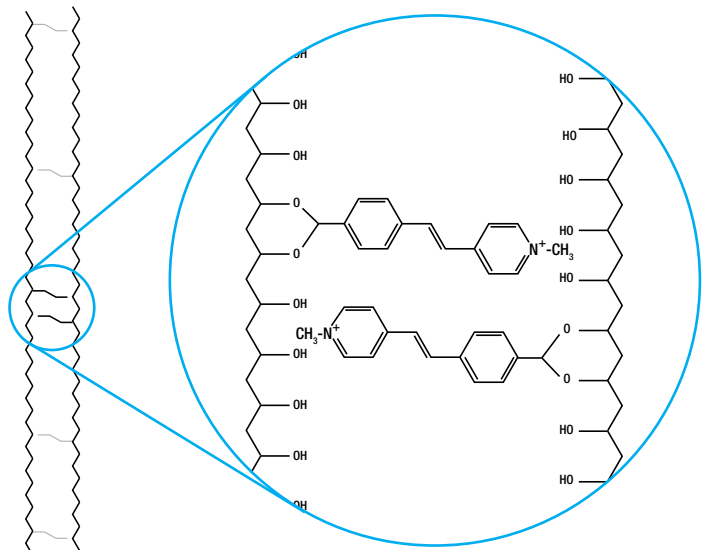


Figure 2: Alignment of SBQ groups

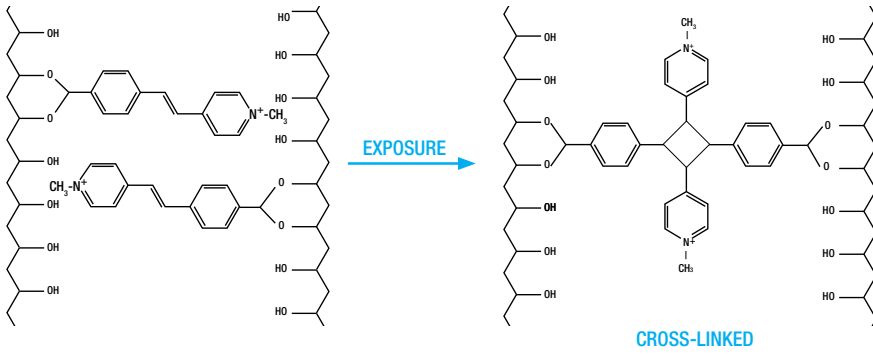


Figure 3: Cross-linking step

full stencil thickness. Full cure is required to maximise durability and printing life, and this aspect becomes even more critical when using very aggressive inks, such as textile printing with water-based or discharge ink.

Use of LEDs for screen exposure offers many advantages, including low power consumption, cool running, extended lamp life and mercury free construction. Also there is the ability to use a simple timer to control exposure, instead of photocells and light integrators, because LED light output is stable and constant unlike metal halide bulbs that gradually degrade and lose intensity. LED exposure is also now widely used in computer

to screen (Cts) imaging, including direct to screen image-setter systems, such as the CST DLE, as well as in-line exposure ink-jet masking systems, such as the M&R I-Image STE range of products.

THE IMPORTANCE OF A GOOD MATCH

Because LEDs are designed to emit a very narrow band of very high intensity light, the selection of LED wavelength now becomes critical. There must be a good match between LED output and PVA-SBQ sensitivity in order to ensure best chance of thorough stencil curing and wide exposure latitude. A poor match will yield inconsistent results, maybe

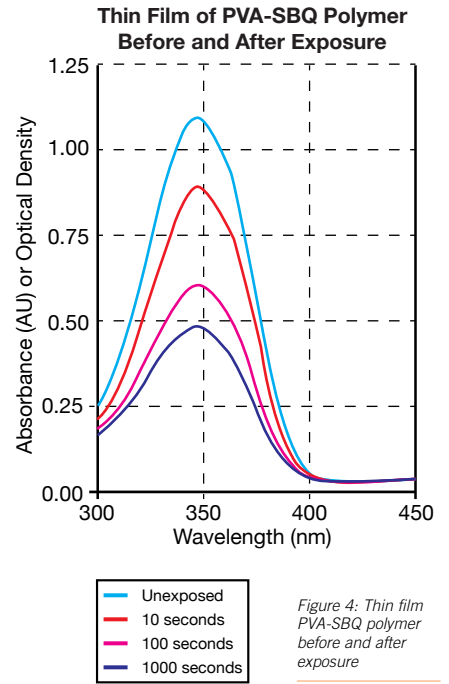


Figure 4: Thin film PVA-SBQ polymer before and after exposure

with success on thinner coatings, but failure when stencil thickness is increased, or lower mesh counts are used.

Figure 4 shows the absorbance spectrum of a very thin film of PVA-SBQ polymer.

The SBQ chromophore is a powerful light *Continued over*



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PVA-SBQ Film Absorbance vs. Wavelength

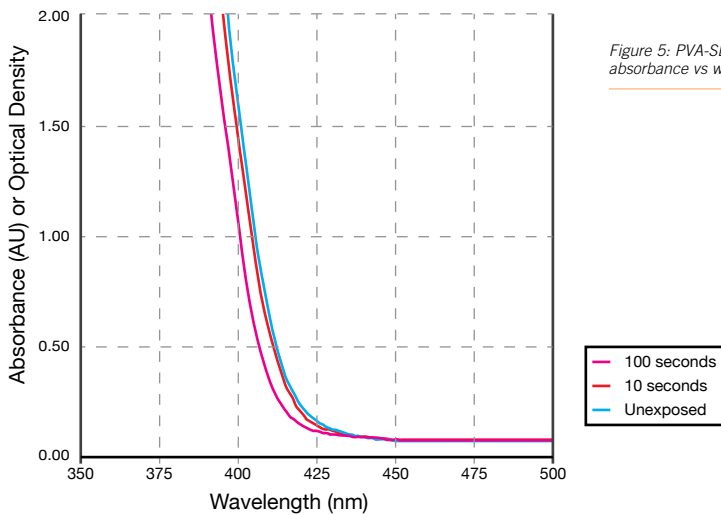


Figure 5: PVA-SBQ film absorbance vs wavelength

PVA-SBQ Film Transmission vs. Wavelength

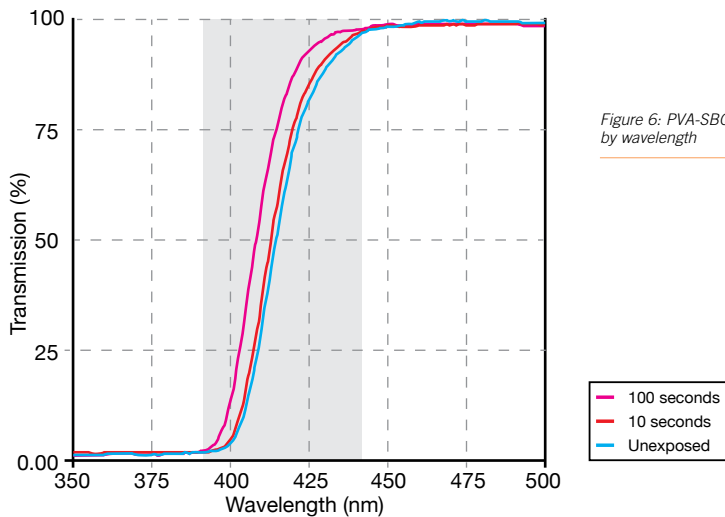


Figure 6: PVA-SBQ transmission by wavelength

absorber, and maximum absorbance occurs in the UV part of the spectrum, that's below 400nm. Also shown is the result of exposing this film and the 'bleaching', or reduction in absorbance, that occurs during exposure. Bleaching happens when cross-linking consumes the reactive groups. This lower absorbance is shown after 10s, 100s, or 1,000s exposure time. It's clear that longer exposure times reduce the absorbance, but there's a problem. Typical exposure times required to make high quality stencils, with good resolution, consume only a fraction of the available reactive groups. These happen to be the ones that were perfectly aligned during drying of the coating, and are well placed to react quickly. Extended exposure times can cause additional reaction, but are not practical because of degradation in stencil quality due to loss of resolution. In any case, it's clear that even extremely long exposure times, up to 100 x over-exposure, cannot reduce the residual UV absorbance of the coating down to zero.

THE IMPLICATIONS OF UV LIGHT EMITTING LEDs

This has serious implications for use of UV light emitting LEDs, for example 365nm or 385nm LEDs. Light of these wavelengths is so strongly absorbed that it cannot penetrate the full thickness of the coating. Matching the LED output wavelength to the absorbance spectrum of the coating might seem like a sound idea, but in practice yields poor results.

Figure 5 and 6 show respectively the absorbance and transmission spectra for a typical coating of PVA-SBQ polymer, one that would be thick enough to be used as a stencil for screen-printing.

This thicker film now displays very high optical density, and absorbance goes basically off the scale at UV wavelengths, even after extended exposure times. As Figure 5 shows, absorbance is >2 at UV wavelengths below 390nm.

For reference, absorbance and optical density can be used interchangeably, and a density of 1 AU (absorbance unit) is equivalent to blocking 90% of the light, or

Variation of Sensitivity with Wavelength

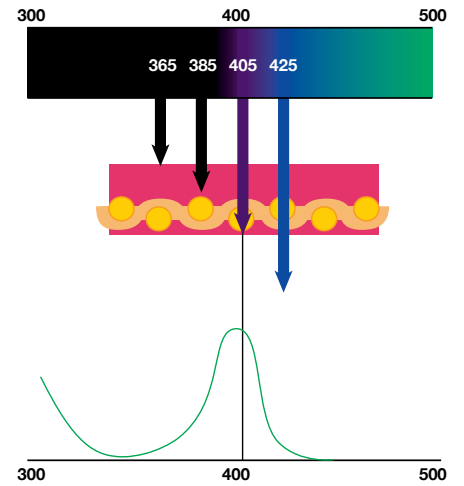


Figure 7: Variation of sensitivity with wavelength

equivalent to 10% transmission. Density of 2 AU blocks 99% and allows only 1% transmission, and so on. Typically a density of 3+ is desired for high quality film positives.

Consequently, the very high absorbance, and almost zero percentage of light transmission below 390nm for a typical coating means the coating is essentially opaque to UV light. Since UV light is unable to penetrate the full thickness of the coating, it therefore cannot be responsible for exposing deeper layers of the stencil.

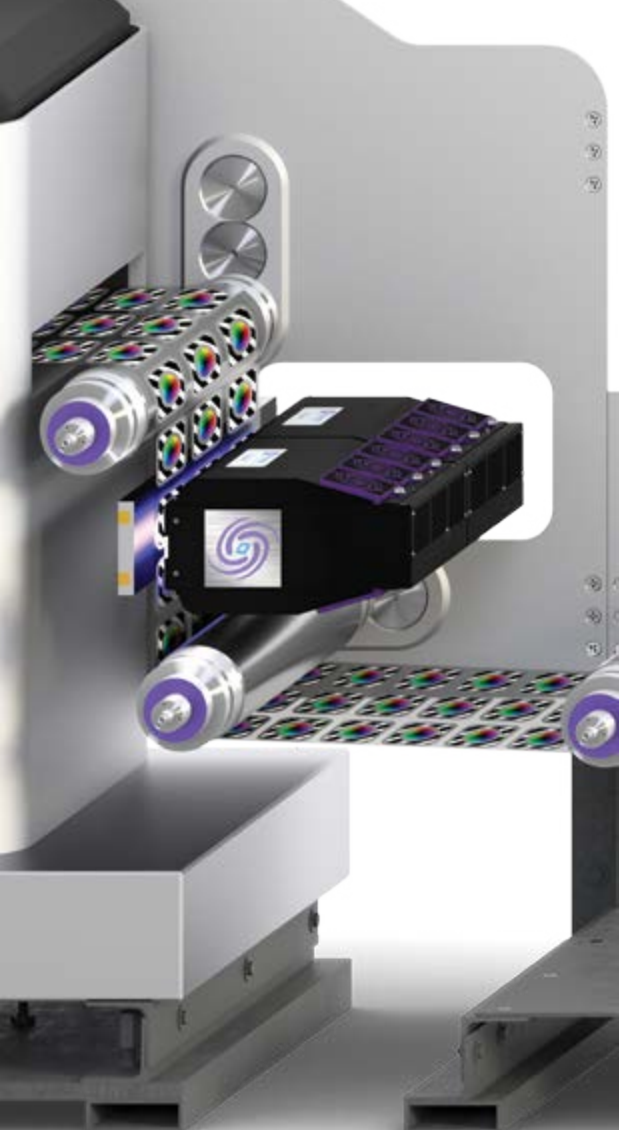
THE RELEVANCE OF ABSORBANCE

More important, it's also now apparent that the tail of absorbance curve actually extends beyond 400nm and into the blue part of the actinic light spectrum. Although the absorbance around 400nm looks weak, or even non-existent, when looking at the spectrum of the thin film in Figure 4, it's clear that thicker coatings, as shown in Figure 5, do in fact display strong absorbance. Our typical coating used for stencil making in this case absorbs more than 90% of the available light at 405nm, and the stencil is very sensitive to exposure at 405nm. So, it's now very apparent that maximum absorbance and maximum sensitivity are not the same thing.

The light transmission spectrum illustrated in Figure 6 also shows that the PVA-SBQ coating becomes 100% transparent to light above 440nm, and light that is not captured cannot be used for cross-linking. In practice, there is a narrow band of wavelengths, above 390nm and complete opacity, and below 440nm and complete transparency, where light is absorbed strongly enough to cross-link a stencil, and yet is still able to penetrate and expose the full thickness of the coating to ensure durable stencils.

This effect is illustrated in Figure 7 and shows the relative ability of light from commonly used LEDs to penetrate and cure a coating, to expose and create a stencil.

Continued over



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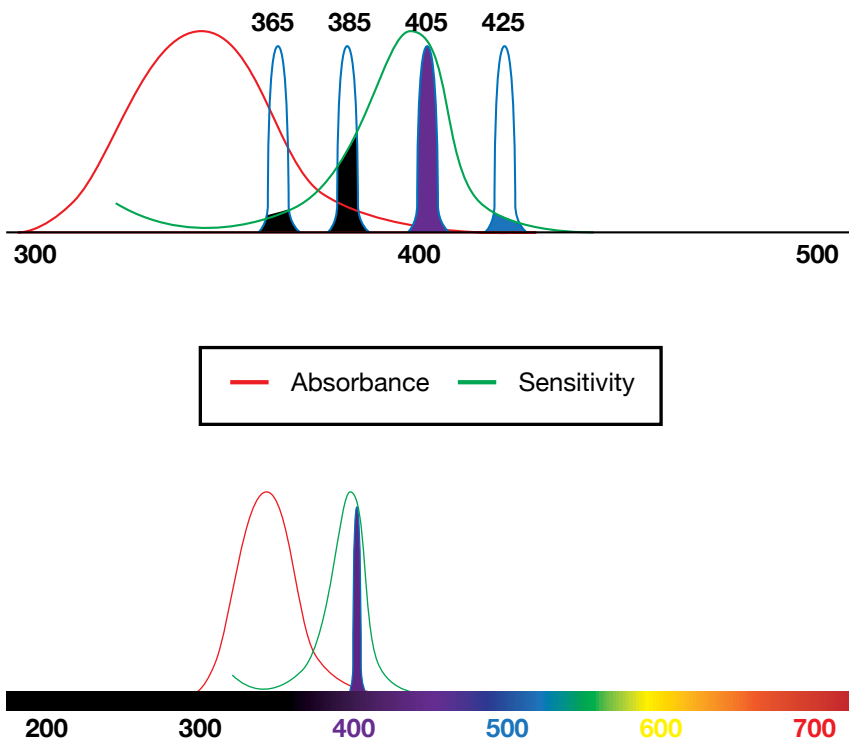


Figure 8: Absorbance and sensitivity vs wavelength

CURE DEPTH AND WAVELENGTH

The depth of light penetration into the coating = cure depth. Cure depth is heavily dependent on wavelength. Stencil adhesion and durability are directly related to cure depth.

- 365nm low sensitivity – only surface cure because stencil too opaque
- 385nm cannot penetrate thicker coatings – poor exposure latitude
- 405nm penetrates deeply – optimum stencil cure & exposure latitude
- 425nm is too weakly absorbed – poor cure because stencil too transparent

So, there is a practical relationship between wavelength and maximum sensitivity, which peaks around 400nm, and is driven by depth of cure requirements for the relatively thick layers that must be exposed to produce a typical screen-printing stencil.

Another way to illustrate the relative efficiency of commonly available LEDs is shown in Figure 8. This also shows the relationship between absorbance and sensitivity, and they are clearly not the same thing.

The ideal overlap of 405nm LED actinic light output, with the sensitivity curve of PVA-SBQ polymer, makes this type of LED the best replacement for traditional metal halide bulbs that previously represented the gold standard for exposure lamps.

ANALYSIS OF SENSITIVITY PROFILES

In fact, now that we have established a sensitivity profile, a similar analysis can be carried out that compares light output of traditional mercury vapour UV lamps and metal halide lamps. Metal halide lamps are basically just mercury vapour lamps that are doped with additives. The additives are used to provide enhanced light output at actinic violet and blue wavelengths. These doped metal halide lamps are very widely used, and it's a commonly accepted fact they far outperform the basic mercury vapour version, that is little/never used to make screen-printing stencils. This comparison is illustrated in Figure 9 and shows the overlap of the sensitivity curve with the relative intensity of light output from both these lamps.

The excellent overlap of sensitivity curve with the light output of metal halide lamp provides further confirmation that it is enhanced violet/blue actinic light output, and not UV, that is most effective in curing screen-printing stencil materials. It also further confirms 405nm LED as the most suitable choice for metal halide replacement. ■

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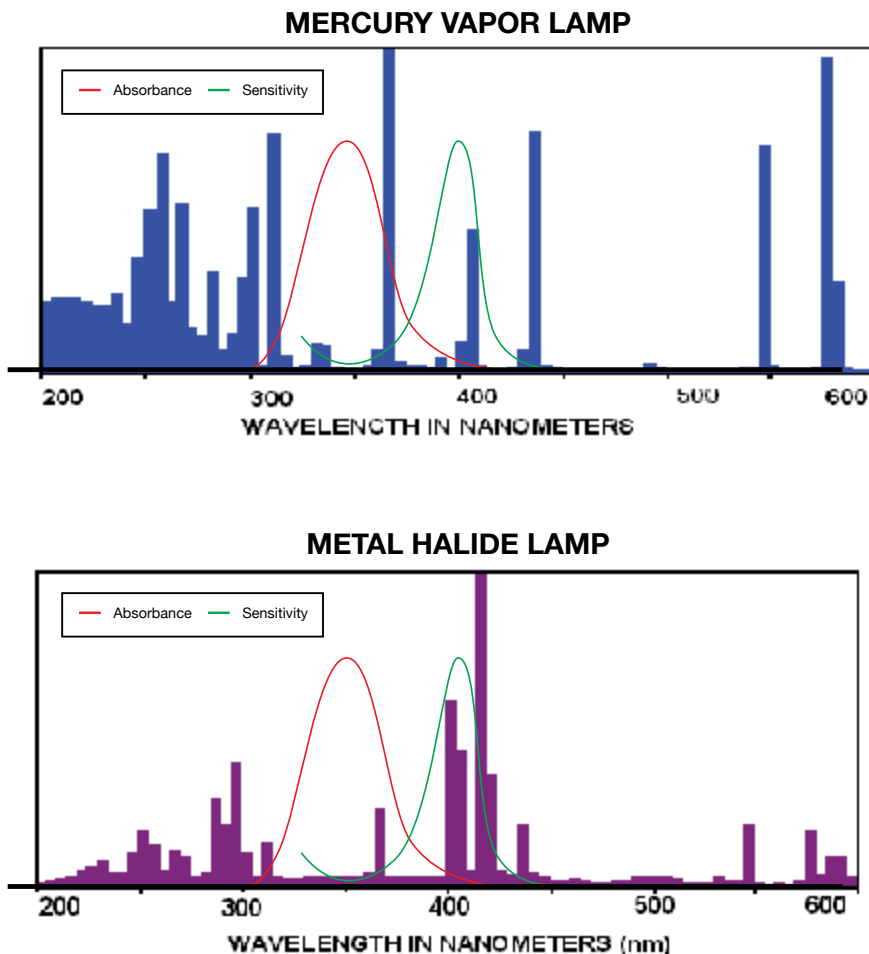
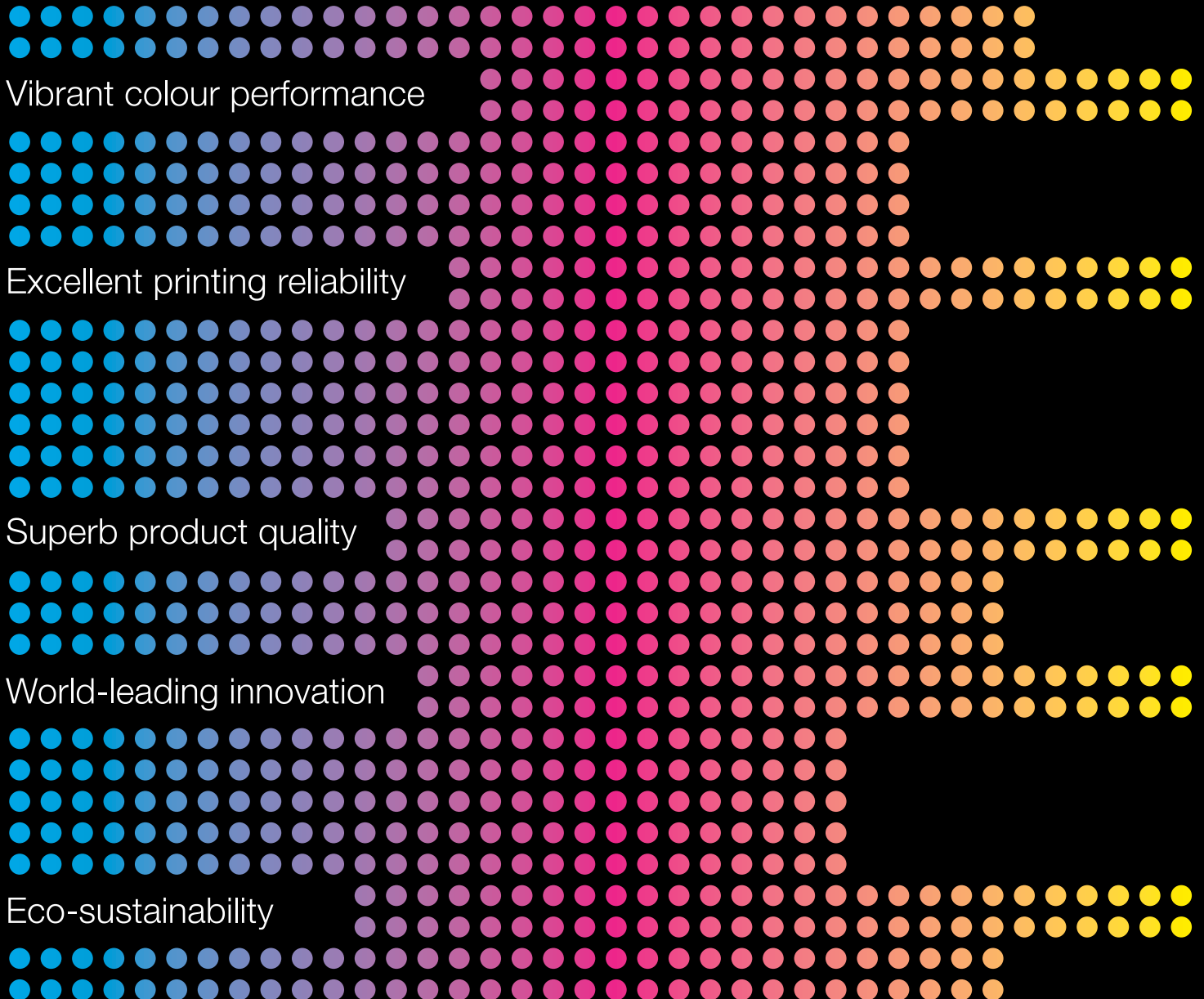


Figure 9: Light output using older technologies

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THE STATUS QUO OF DIGITAL PRINTING IN THE WOODWORKING INDUSTRY

Dr Anke Pankoke outlines the advantages and options of industrial single-pass technology

In 2009 Hymmen presented the first single-pass digital printing line at the Ligna fair. Since then, more than 30 industrial digital printing lines have been sold and Hymmen has become the market leader in the woodworking industry. Many customers are so convinced about this innovative technology that they ordered further lines identical in construction. Other companies have not yet discovered the benefit of this forward-looking digital printing technology for themselves. This status quo report summarises the advantages and options of industrial single-pass digital printing in the woodworking industry.

DIFFUSION OF DIGITAL PRINTING IN DIFFERENT INDUSTRIAL SECTORS

Digital printing is an innovative technology, which has been established to various degrees in application, dependent on the industry sector. For a long time already, digital wide-format printing has gained acceptance in the graphics sector; also, in the printing of ceramics, the conservative majority is now convinced of the advantages of digital printing. In the sectors for commercial printing, labels, fabrics/clothing and packaging the conservative people are not yet convinced of digital printing, but there is a majority of innovative companies.

The most innovative users of digital printing in the woodworking industry are the flooring manufacturers. In the field of decorative laminates, it is only the visionaries who believe in the positive future of digital printing. Companies working with textile printing for indoor applications are also careful. Even smaller is the number of users in the field of decorative furniture finishing; only the technical enthusiasts proclaim the advantages of digital printing in the industrial environment.

When taking a closer look at the woodworking industry, only 6% of companies have invested in digital printing so far. The vast majority still prefers analogue technologies. Pioneers are kitchen furniture with 30%, followed by office, living and bedroom furniture with 20% each. 17% of the digital printing users in the woodworking industry are manufacturers of laminate flooring [figure 1], 5% interior fittings (Source: Munksjö Paper).



Figure 1: Classen produces laminate flooring of highest quality level with Hymmen technology

ADVANTAGES AND OPTIONS OF DIGITAL PRINTING

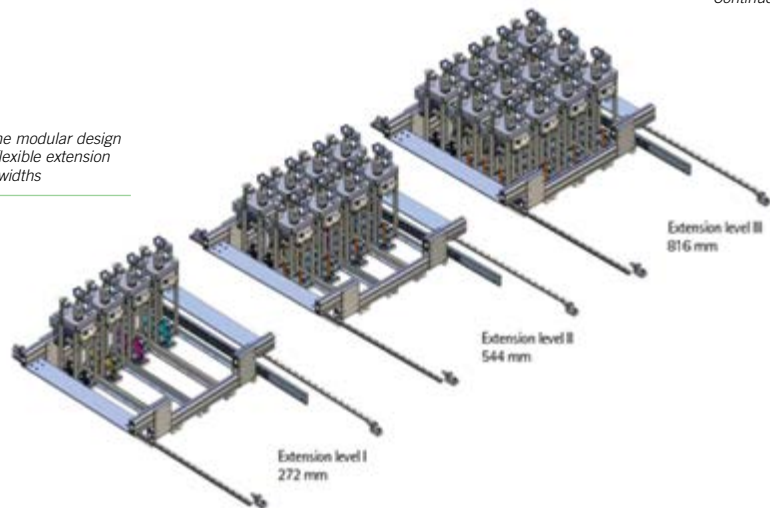
The detailed number of applications shows that many companies have not yet realised the options of digital printing for their business. These are not only based on the industrial production capacities which are enabled by the single pass printing by Hymmen. Also the production of smaller batch sizes on an industrial level can be realised and set-up times

are minimised. Storage costs are reduced. There is no overproduction necessary, logistics costs are reduced, there is less material loss and the internal passage time is reduced. Finally, the digital processing of decors opens a wide field of new design options.

Industrial production capacities can be demonstrated most suitably by means of some selected models of the single-pass digital printing lines by Hymmen. The Hymmen

Continued over

Figure 2: the modular design enables a flexible extension of printing widths



Exempel: Calculation for 2 shift operation

230 days – 16h/day – capacity factor 85% - board material

Printing width (mm)	272	544	816	1360	2176
25 m/min					
m ² /day	4.716	9.433	14.149	23.582	37.732
m ² /year	1.084.790	2.169.581	3.254.371	5.423.952	8.678.323
35 m/min					
m ² /day	6.603	13.206	19.809	33.015	52.825
m ² /year	1.518.707	3.037.413	4.556.120	7.593.533	12.149.652
50 m/min					
m ² /day	9.433	18.866	28.299	47.165	75.464
m ² /year	2.169.581	4.339.621	6.508.742	10.847.904	17.356.646

Figure 3: exemplary calculation for the capacities of an industrial digital printing line by Hymmen



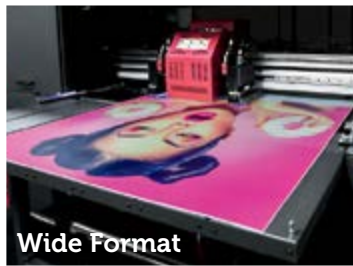
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Industrial Textile



Label and Narrow Web



Wide Format



Soft Signage



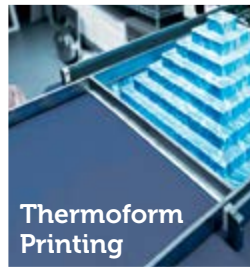
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Jupiter digital printing lines have a modular design and can be extended flexibly [figure 2]. They are available for printing widths of 70mm up to 2176mm and designed for high capacities. Figure 3 shows an exemplary

calculation in two-shift operation.

The industrial production of small batch sizes is possible since décors can be changed without loss of time. The specification of production quantity and décor picture is

possible by means of operation planning databases. A production of an 'excess production' is not necessary. If faults occur during further processing of the imprinted boards, even very small quantities of this decor may be reproduced without any problems.

DIGITAL BENEFITS

The minimisation of set-up times is achieved since the décors can be changed without loss of time, there is no time lost due to roller change and the colour matching of new décors can clearly be carried out faster. A post production can almost be realised without any loss of time.

Another advantage of digital printing is the reduction of storage times. It is not necessary to store paper which has been printed elsewhere. The same applies to printing cylinders. Moreover, there will not be any overproduction any more. As a result, storage space, personnel and capital commitment are saved.

Last but not least, digital printing offers new design opportunities. Rapport lengths are no longer limited to the cylinder circumference of mostly 1.3m. The printing of long planks without décor repetitions is enabled this way. Moreover, the cylinder rapport does not have to be repeated on a large board. Therefore, it is possible to have more than the usual six to ten different planks on one large board. Several large boards may belong to one décor and an arbitrary number of décor variants can be produced in variable sequence. Thus it is possible to produce a large number of planks without repetition [figure 4].

When comparing the whole process [figure 5], digital printing offers clear advantages for the manufacturer against gravure printing. The manufacturer:

- only needs to buy white paper
- only needs to produce the required order quantity
- does not have to provide more paper than what is actually needed for the order
- does not need to run an impregnation line
- does not have to organise material storage and availabilities

What has been prepared here theoretically is also proven by the experience of Hymmen customers in real production operation. In figure 6, some citations are reflected. ■

This article is based on the lecture by Carsten Brinkmeyer, Hymmen Industrieranlagen, Head of Sales Digital Printing, at IHD Fußbodenkolloquium 2015.

Dr Anke Pankoke is Head of Marketing and PR at Hymmen Industrieranlagen

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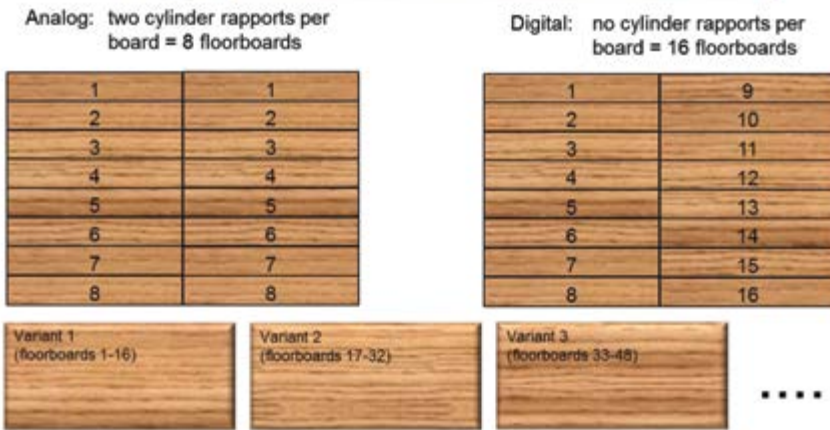
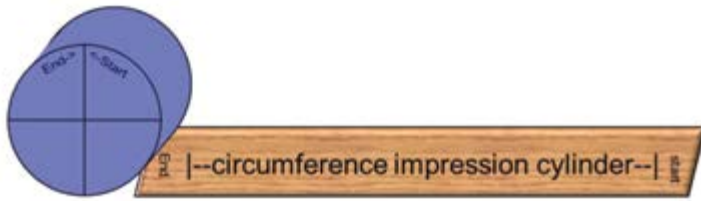
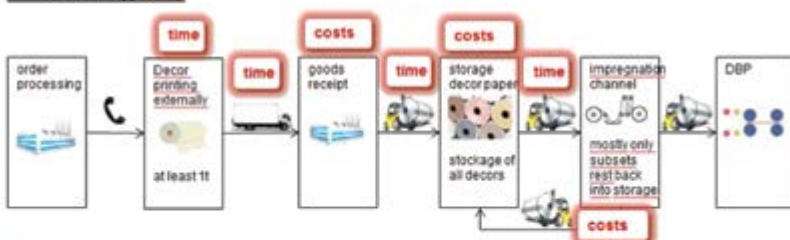


Figure 4: the independence of the rapport length in digital printing multiplies the design options of the décor

The analog way



The digital way



Figure 5: process comparison between digital printing and gravure printing

Our customer's votes:

„The Digital Printing enables us to halve the time to delivery.“

„The prototyping of new decors and the setup time for a post production was reduced to a minimum by process control and color management.“

„The Digital Printing offers new décor designs, that we would not be able to deliver with the conventional process. Extra long flooring boards and a huge variance of decors without repetition are two examples.“

„In 2014 we already have digitally produced 7 million square meters. Right now we are producing more than 500.000 m² per week digitally.“

„In 5 years a forward-looking flooring plant will distinguish itself by realizing at least three quarters of its production via Digital Printing.“



Figure 6: customer opinions of Hymmen digital printing

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THE EVOLUTION OF THROUGH-HOLE SCREEN-PRINTING

Mike Bacon unfolds the advantages of vias when working with conductive inks

When a manufacturer of printing equipment develops a new technology that meets a specific customer application there is a short-lived congratulatory moment that follows. These moments can be celebrated through awards and publicity, but the key for the equipment manufacturer is taking this technology and finding mass appeal so that a product line can be developed. For niche markets, the appeal falls into a smaller pool of users but, within this circle, the technology is priceless.

Equipment manufacturing technology is typically born from a fundamental problem that is identified with an existing technology. This is followed by a person or group of people that are familiar with the existing technology and have the ability to make the technology better. Sometimes the breakthroughs are significant, like the light bulb or the Internet, while other times they are simply enhancements to an existing technology such as the iPhone 6 or a new version of an automobile. Nonetheless, it is innovation that drives technology.

As manufacturers of printing equipment, companies continue to develop technology that will provide a better product at a cheaper price, reduce the number of rejects from a given process and create greater efficiencies within a given process.

Over the past few years, printed electronics suppliers have turned their attention to reducing the manual intervention required for producing through-hole printed flexible circuits on pre-cut material. The pre-cut holes are called vias.

VIA HOLE PRINTING

Vias are small holes that allow conductive inks to pass through the top surface of the substrate to the under surface. This provides for electrical connections between the conductive patterns on both sides of the base material. Via hole printing was developed to take advantage of both sides of the substrate for extremely intricate and densely populated circuit designs.

Due to an increase in the complexity and demand of modern flexible circuits, screen-printing equipment manufacturers have been asked to develop better ways to achieve through-hole printing that moves away from traditional sheet-fed screen-printing. Previously, through-hole printing

was designed to print conductive ink on pre-cut sheets of material with a filter paper sheet that required manual insertion and removal by the operator.

During high-volume runs, ink build-up can be transferred to the screen-printing bed and require the operator to clean the bed every time a sheet is removed. While the filter paper is necessary to keep conductive inks printed through via holes from remaining on the screen-printing bed and ending up on the next sheet placed in the screen-printing station, there had to be a better way to screen-print flexible circuits.

AUTOMATING THE PROCESS

How could this process be automated? The most efficient way was to offer a roll-to-roll flat-bed screen-printing machine with a roll of filter material that moves along with the printed material. This filter material unwinds and rewinds through the screen-printing zone and dries before it reaches the rewinding roller. The filter material can then be re-used on another job, further reducing costs to the supplier.

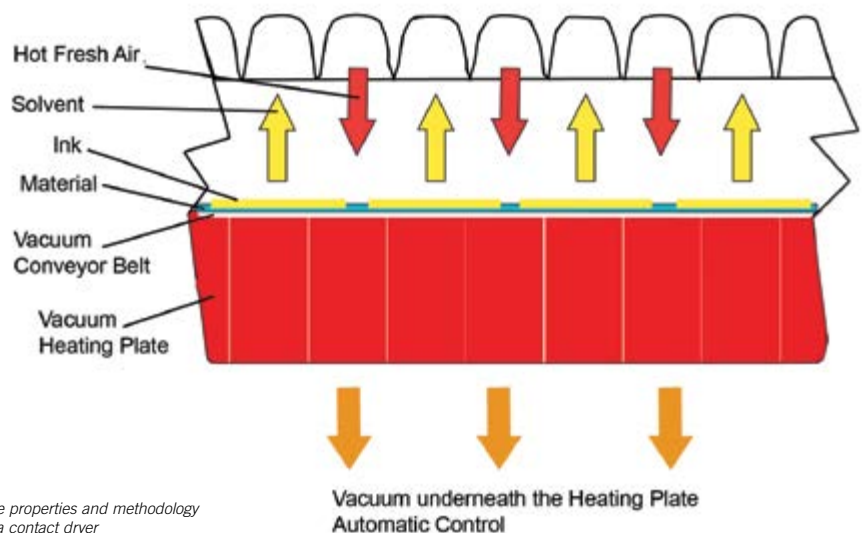
How does roll-to-roll via hole printing work? The optimised thickness and structure of the roll of filter material increases the quality of the through-hole print by greatly reducing the smearing of inks from the vias on the opposite side of the material. This greatly reduces the number of rejects for a given job

run. Flat-bed printing equipment that offers roll-to-roll filter options incorporate a vacuum table surface that holds the material in position during the printing process. The stronger the vacuum pressure, the better the material is held in position.

Pre-cut material requires specific control of the vacuum intensity to hold the material in position and help to transfer the ink through the via holes. Roll-to-roll systems also include an electronic vacuum sensor that measures the amount of suction on the printing table and adjusts the vacuum pump automatically. This ensures that the vacuum suction is the same no matter how many holes are in the pre-cut material.

The accuracy of the printing process also depends on the material stabilisation. The main material substrate and filter material are transported using the same servo driven system which provides even greater accuracy for the via hole printing. The overall tolerance on most systems is +/- 0.004 inch.

Another advancement of roll-to-roll screen-printing via hole printing is the increased efficiency of drying conductive inks. Most ink manufacturers will tell you that inks can be made to dry quicker by using a faster evaporating solvent system. The upside to this method is that the inks dry faster in the dryer. However, the downside is that the inks also dry faster on the screen which creates ink build-up on the screen.



The properties and methodology of a contact dryer

DRYING SYSTEM EFFICIENCY

Traditional systems use a hot air dryer system that blows hot air across the top of the printed substrate. This process is effective and is utilised in many screen-printing systems; however, advancements in contact dryers help customers dry conductive inks up to 70% more efficiently. The main advantage of a contact dryer is that the drying element is underneath the substrate therefore evaporating the solvent from the bottom to the top. For example, if you turn on a normal baking oven at 65 degrees C (150 degrees F) and put your hand in contact with the heating elements, you will get burned immediately. If you put your hand in the oven without touching the heating elements, you can leave your hand in the oven for a longer period of time without getting burned. Hot-air drying versus contact drying is the same idea.

When using a contact dryer, the printed substrate runs over a vacuum plate system that dries the ink from the bottom and does not allow the hot air to escape. Traditional air drying systems blow hot air across the top of the printed circuit and can be subject to what is known as 'skin effect' or drying on the top and not all the way through to the bottom. In general, more concentrated heat over a vacuum plate has shown to give the inks more conductive properties and increase the speed in which the inks dry.

REDUCING THE FOOTPRINT

The final advantage to the contact dryer is it reduces the overall footprint of the system design. Since the contact dryer is more efficient, the space required for the drying system can be reduced. When determining floor-space requirements for a screen-printing line, this advantage can make a great impact when positioning a system in an existing facility or planning for expansion or a new facility.

The technology for producing more efficient screen-printed via hole products has changed due to the co-operation between flexible circuit printers and equipment manufacturers – a specific problem with a specific solution. The advancements derived from packaging existing technology in a different way. The change from sheet-fed via hole printing to roll-to-roll printing technology tremendously reduces labour costs and part rejects. Furthermore, the ability to gain up to 70% efficiency in drying time and reduce the space required for the overall system design adds to the overall technology driven solution.

Can the solution be compared to the significance of the original iPhone? No. Does it help in designing different and more powerful versions of the iPhone? Absolutely. ■

Mike Bacon is the Vice President of Sales and Marketing for Systec/Spartanics

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MIGRATION AND THE SUBSEQUENT REQUIREMENT OF PRINTING INKS FOR FOOD CONTACT MATERIALS AND COSMETIC PACKAGING

The specifications for this market segment are described by Pascal Iffland

Packaging exists in different forms and types which are an indispensable part of everyday life. Especially in the case of sensitive contents, such as foods and cosmetics, the question arises as to product safety. Do packages really protect their content or do they represent a health hazard?

In addition to increasing technical and visual requirements of the decorated surface, minimising the unwanted transfer (migration) of dangerous substances is becoming more and more important as the health of consumers must not be affected. The safety of the packaging material, which comes into contact with the sensitive contents, is regulated by appropriate legal standards.

Printing inks come into contact with these sensitive contents by printing of the packaging material. So, for the conformity of the contact material (for example cosmetic packaging), you also have to consider the transfer of substances coming from the ink. Beside the sensitive content and its related statutory regulations, migration appears in three forms which will be discussed in the following.

ALL MIGRATION IS NOT THE SAME

Mass transfers from printed packaging onto filling material occur in different ways. These are diffusion migration, set-off-migration, and gas phase migration.

Diffusion migration is a migration of printing ink ingredients through the substrate. Due to their chemical characteristics and molecular size (molecular weight < 1000 daltons) some substances, known as

'migrants', are able to migrate from the printed side through the substrate to the unprinted side. This is highly dependent upon the barrier properties of the substrate.

The second type of migration is known as set-off migration. This takes place in the form of direct material transfer from the printed side being in direct contact with the other (unprinted) side of the packaging. The contact of these sheets happens after the printing process in a stack, roll, or nested container.

The third type of migration is termed as gas phase migration. This occurs due to the evaporation of volatile materials by heating food in its original packaging. This migration also happens as well by steaming, cooking, baking, or sterilisation.

MIGRATION MAINLY DEPENDS ON THREE PARAMETERS

- 1) Substrates. As far as the migration is concerned, the substrate plays a significant role. The greater the barrier properties, the lower the risk of migration (functional barrier). Materials/substrates which are completely impermeable for substances, like glass or some metals (for example aluminium foil of at least 7µm) are established as 'absolute barriers'. A migration of substances through these materials/substrates (diffusion migration) is simply not possible.
- 2) Printing Ink. Migration is an issue for all kinds of printing inks. The selective use of high molecular weight substances (eg higher-functional monomers in UV inks), the specific selection and purity of the raw materials, as well as tailored production conditions (in order to avoid process-related impurities), can significantly reduce the amount of migrating substances compared to conventional inks (not developed specifically for this application).
- 3) Process Conditions. Effective drying and curing of the ink film is the prerequisite to minimise the existence of potential migratable substances, like solvents and monomers. Set-off, where possible, must be avoided throughout the entire printing process. The thickness of the ink film and the ratio of printed to non-printed surface

area determines the total amount of the potentially migratable substances from the ink. The more ink is used, the greater is the possibility of migration.

CONCLUSION – INK, MIGRATION AND BARRIER

Even if printing inks are designed for this purpose, a migration test on finished products is indispensable. Unexpected factors in the process chain, such as printing parameters, processing conditions and the choice of packaging components can also affect the migration risk. So the monitoring of compliance must always be done with the ready printed material. Quality standards, which are set for the printed materials are, therefore, essential.

MARABU'S INNOVATIVE ULTRA PACK UVPC – UV-INK FOR COSMETIC PACKAGING

Marabu is aware of the problem with migration and has developed a special UV-ink for cosmetic packaging. The UV-ink Ultra Pack UVCP is suitable for pre-treated polyethylene, pre-treated polypropylene, and polycarbonate. Based on foodstuffs packaging specifications, the substances of Ultra Pack UVCP are subjected to special selection and purity criteria. Marabu has taken into account the EuPIA Suitability List of Photoinitiators for Low Migration UV Printing Inks and Varnishes, Part 1A, of the Nestlé Guidance Note on Packaging Inks, and also the resolution AP (89)1 for pigments used. In addition, Marabu does not use any ingredients which are based on the harmful Bisphenol A. The ink series Ultra Pack UVCP is especially suitable for printing cosmetic packaging. Its advantages are fast cure, great adhesion, chemical and scratch resistance, and brilliant colours. ■

Pascal Iffland is Product Manager, Screen and Pad Printing Inks at Marabu

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The ink series Ultra Pack UVCP is particularly suitable for printing cosmetic packaging



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JAPAN - USA - CHINA - SINGAPORE - KOREA - TAIWAN - EUROPE

COMBINING LARGE AND SMALL

Mike Horsten outlines why the whole can be greater than the sum of its parts



Mike Horsten

Ever wondered why people like big things? Maybe it's just that we like to impress. The world of digital print has been impressing many of us over the past several years with faster performance, more colours and bigger sizes. The idea that every print can be different has been one of the most attractive additions digital printing has brought to the print world. In fact, digital has driven a significant revolution in printing, which has come a long way since Gutenberg and even since offset dominated in the last century as more capabilities in toner-based digital print were brought to the market. Now, the latest ink-jet technologies are set to take digital printing to the next level.

Many of the conventional suppliers to the printing industry have left the building or have embraced new digital technologies. But their heritage has caused them to approach these developments with the conventional processes always in mind. Creative thinking was never the objective; the objective was to find replacements for older technology, reducing the amount of chemicals required and the time required for producing printing plates. In effect, they have adopted digital technologies as a way of protecting their share of the global print volume, which is increasingly migrating to digital technologies, with or without their participation.

CYCLE TIME IS NO LONGER AN ISSUE

So what is the next step for printing? The wide distribution of these new systems has helped customers understand that cycle time is not an issue anymore. Delivery times are faster and the output is high quality. Still, there are many screen-printers in the world that have not yet embraced digital production methods. This has primarily been due to the price of the equipment investment, or their lack of understanding the business model around digital. But all of that is changing with the growing number of flat-bed UV-LED ink-jet printers, now available in the market.

The opportunities are almost limitless, and the time to produce small runs is less than the time it takes to even make the screens with old technologies. Plus, digital technologies don't require noxious chemicals, long set-ups and make-readies, and cleaning of screens between jobs. If the quality and speed of digital can surpass that delivered by screen-printing and, as the economic order quantities for digital continue to climb, we believe the writing is on the wall for screen-printing, just as it has been for some time for offset printing. Neither will go away fully, but their importance in the scope of things is declining. And print service providers in these segments must certainly take the leap and invest in digital technologies, if they have not done so already. It's becoming a matter of survival.

AFFORDABLE DIGITAL SOLUTIONS

At Mimaki, we have been able to produce an affordable digital solution that will help screen-printers move into digital. Our smaller format flat-bed printer with a size of 2.50 x 1.30m has been the right solution to replace a great deal of screen-print production. The use of a full colour printer means that there are no registration problems and the need to rasterise a 60-line screen has disappeared. We now even have contone printing at the size of a screen.

Not only that, we have been able to eliminate all the chemicals, meaning print operators can now have a clean and environmentally sustainable work space – no ink on the floor, no screens to clean, and the

space required to store screens can be put to better use. Now you can print on demand what the customer needs with no fuss.

But there is more! The big news is that you can also combine the two technologies in a hybrid model, just as is being done in the offset world. Just imagine pre-printing using screen and imprinting using digital. This would save even more time and money. An example would be supermarket posters. The logo and background can be printed in volume using the screen process and, with UV-LED white ink, you could digitally overprint to highlight the products on sale each week. This way you get exactly the amount of posters needed with no screen changes. It dramatically improves the cost model and reduces cycle time. This brings back margins and locks in customers. And it gives both you and your customers the ability to be even more creative.

THE TIME IS RIGHT

With the current affordable digital flat-bed solutions that start around 70,000 euros, there is no longer any need to wait for the right time to make that digital investment. The time is now.

We urge you to continue to think big, but also to look for the smaller advantages that can be added to your business by incorporating digital flat-bed printing. No chemicals, no smell, no hassle; just print and make profit. And, with hybrid production that combines the two technologies, you can continue to get value from your older screen-printing investments, extending their useful life while significantly expanding your range of offerings. This is clearly a case of the whole being greater than the sum of the parts. ■

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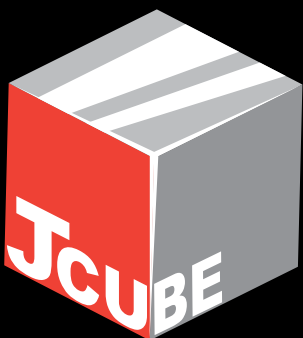


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HIGHLIGHTING PROSPERITY FOR THE PORTUGUESE TEXTILE INDUSTRY

David Forrester Zamith discusses the country's influences and changes

The performance of 2015 demonstrated that there had been a continuous and sustained series of strong sales growth abroad during the last four years. Portuguese textile exports grew more than 38% in the period highlighted from 2009 (the worst year for the last decade and a half) and this was a result of a restructuring that focused on new drives such as technological innovation, design, automation and advanced logistics, all of which were leveraged in service-intensive and strong investment in international awareness. In total, the sector exported €4.83 billion, and this showed an increase of about 5% compared with 2014.

According to the statement from ATP-Textile and Clothing Association of Portugal: "[...] is of particular importance [relative to] the behaviour of technical textile exports, which registered a growth of 10%, which confirms a trend of diversification in the industrial sector," states Paulo Vaz, ATP Managing Director, adding that the development is in accordance with the strategic plan presented by the ATP in 2014. "... which predicts by the end of the decade a quota of 30% for technical textiles in total production and exports." Home textiles registered the largest growth with an increase of 7% in exports to €08 million.

'MADE IN PORTUGAL'

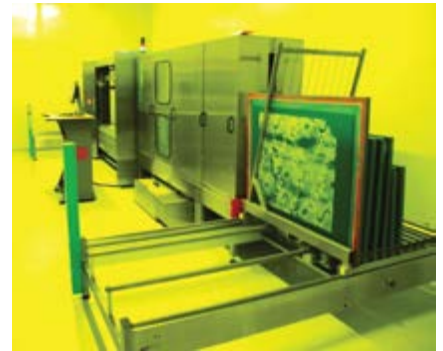
According to the data published by ANIVEC – National Association of industries of Garments and Clothing Europe 28% took over as the

main market for Portuguese exports of clothing in 2015, representing 91.2% of the total shipments of the companies of the sector. Spain, France, United Kingdom, Germany and Netherlands occupy the first five positions in the list of the largest garment markets 'Made in Portugal', representing 78.4% together of all clothing exports. Outside Europe, the USA leads the top of the main garment markets in Portuguese having increased its purchases and despite only making a small contribution. Additionally, China is showing preference to the good image of the Portuguese garment and fashion industry.

ATP already indicates that 2015 numbers anticipate reaching the goal of €5.0 billion as early as 2016. This means it is four years ahead of schedule in the strategic plan.

SCREEN AND DIGITAL KEY TECHNOLOGIES

The new market demands are presenting a challenge for digital printing as clearly seen at ITMA and FESPA. These include fast sampling and supply, new creative designs or functional applications, different time zones, a new trend for different smaller runs and new innovative printing solutions. Portugal is following these demands exactly and digital is growing in signage, sublimation and home textiles based on roll-to-roll technologies for larger applications. All the traditional players are present in the market, such as EFI Reggiani, MS, MTex and Mimaki, according



In-line automation leads to less handling and lower costs

to the segments showing significant growth in the last two years. At ITMA, SPG Prints announced the sale of its new Pike single-pass digital ink-jet printer in Portugal and this will bring higher flexibility, new print quality, productivity and cost efficiency set up to the Portuguese textile market.

All digital infrastructures (from image to print) are responsible for other pre-press and printing systems with the aim to improve, to innovate and to present automated solutions. However, rotary screen-printing is still growing in global terms with new CtP resolutions or finer mesh and, on flat-bed screen-printing, new CTS. These technologies utilised within this field of textile pre-press and in the graphic segment, mean that many smaller runs are also moving to digital printing. Therefore, digital and screen share their own advantages and solutions if image, pre-press and resolution are in balance to print photographic quality images – photo-realistic four-colour process vs traditional separation of solid colours.

PORTUGUESE TEXTILE-FASHION INDUSTRY (T-SHIRT) GOES SCREEN

Increasingly there is a tendency to use 'multi printing systems' where digital is the preference for customised sampling or small production series; this functions side-by-side with other printing systems for medium and large series or where specific features are required. This type of operation is evident in the area of commercial print (offset, digital and finishing) and in labels (flexo, offset, digital, screen, finishing) as well as in textiles (screen, digital printing, digital sublimation, transfers, flat-bed and rotary printing, piece by piece as with T-shirts using reactive dyes,



Digital direct light stencil exposing in-line CTS system – 1270dpi

pigments, water based, lacquers, plastisols, etc). Does this mean that the possibility of differentiation and being competitive with solutions in pure synergy will be the future? We believe so.

But it is essential to invest in new solutions in terms of image processing, colour management, new ink systems and on 'conventional' screen pre-press technology by betting on 'digital' CtS (computer-to-screen) 'filmless' pre-press anchored to a high resolution software RIP and automatic stencil making processes.

NEW CTS GENERATION STM-TEX PRE-PRESS CONFIGURATION:

- No limitation to use mesh/emulsion combinations according to needs
- Real 1270dpi resolution on the screen
- ColorGATE dedicated RIP software for STM CtS technology
- High quality optic Zeiss, sharp edges and perfect auto focus
- Fastest CtS direct exposing technology in the market
- In-line automation, less handling, lower costs
- Full development in automation
- No retouching
- Much better printing results, more output and higher flexibility.

TEXTILE-FASHION T-SHIRT PRINTERS PRO SCREEN-PRINTING TECHNOLOGY:

Industry comments after more 15,000 stencils per year on STM-TEX:

- Faster screen production
- Stencil making department is no longer the production "bottleneck"
- The "bottleneck" is moved to image department
- Easy handling in a fully automated one step process
- Four-colour process with real 1270dpi is standard, easy, predictable and repeatable (photo-realistic)
- Absolutely balanced grey tone scales resulting in high degree of reproducibility
- Fast sampling process
- No need to keep stencils in stock for job repeating
- Electronic registrations reduce print set-up times and lead to higher print productivity
- Digital prepress STM-TEX (CtS) improves existing screen-printing plant layout (ROI)
- Fewer numbers of colours (CMYK based + solid colors + 3D effects as an unique and repeatable standard
- Final print based on four-colour process like sublimation
- High degrees of flexibility, no fabric limitations, no colour intensities, better touch and an economical efficient process

- Digital pre-press is a "must" on textile T-shirt printing

NEW INK SYSTEMS:

Taking in consideration the advantages of digital CtS pre-press technology on modern textile printing by piece, such as the high resolution four-colour process which is fully standardised, it's time to stop and think of the advantages coming from innovative ink systems including those presented by the renamed Italian company Quaglia with its water based Colorsinprocess 4You. This is a four-colour printing highly qualitative and competitive ink system that followed one year of intensive research – <http://www.virusinks.com/4you.php>

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 TTIP – the Transatlantic Trade and Investment Partnership or, in other words, the free trade agreement which the European Union and United States are negotiating, may be the most wonderful opportunity that has presented itself to the old continent since the post-war period, and since the Marshall Plan (the European Recovery Program or ERP). Portugal can be, on its scale, one of the countries that has benefited more.

Continued over

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Unfortunately the local media, such as in most European Union countries, is not giving this due importance or, when it confers, it insists on side issues, minors, only voicing the heralds of an anachronistic ideological prejudice of being 'anti-American', and blurring the essential.

WHAT'S ESSENTIAL?

In first place, TTIP can refocus the geopolitical and geo-economic epicentre of the world in the North Atlantic, creating the greater economic and political interdependence zone ever known. This is because it unites the two largest global spaces, the USA and the European Union, whether in the area of representative democracy as in the trade field or on the increment of mutual investment. Fortunately, the USA understands well and easily a Europe that is threatened by its own integrity, and that is in question. We are no longer considering in this equation the natural extension of the great common economic area in the South Atlantic, giving finally relevance to emerging economies like Brazil or Angola. For reasons or circumstances, these areas have been always well short of their potential, and that, at times can be liable to weaken the global economy, expose painfully frailties and shortcomings.

In the second place, because a new map is being drawn in the energy world, in this area power relation is in rapid change. The USA's self-sufficiency in the energy sector with shale gas is a denominator which, in addition to abundance in American territories, is particularly cheap to produce. This will determine, on the one hand, some relocation since essential productive factors with the power to head become clearly competitive and will, in the near future, export these energy resources. An alternative to Russian gas and resources from the South Mediterranean basin is, at the same time, taking over as one of the leading suppliers of coal now in surplus in the USA to industrialised Europe (namely Germany which is to shut down its nuclear power plants) and to China whose reserves are insufficient to maintain the growth rate of the last decade.

Finally, the free trade agreement with the USA will allow the dismantling of important



The 4C water-based ink system

tariff barriers (existing in products, in particular textiles with tariff peaks exceeding 20%) and regulatory harmonisation in the technical field. These rules of origin are in order to make all processes much more transparent and simpler than those we know today.

Free trade is unambiguously good. It creates competitiveness and growth, promotes innovation, creativity and efficiency in all areas. Obviously, fundamental principles of reciprocity are guaranteed which, as we know, have not been secured by simple incompetence or deliberate primary greed with the entry of China into the WTO. The USA and the European Union are at the same level of civilisation, and are the most developed and prosperous spaces. They have developed and are egalitarian on the distribution of wealth and welfare that exists in the world. This is why there should be nothing to fear about repeating the mistakes of the past, because the conditions are totally different.

As a serious consideration, only for the Portuguese textiles and clothing sectors might result with gains in an export growth of close to €600 million in just four years after the conclusion of the agreement. This means



Direct textile fashion prints produced using four-colour process at 1270dpi

more than double the current sales to that country. And there are many other sectors of our traditional activities, such as footwear, metalworking or furnishings that have the same perspectives.

Having unwavering strategic determination and statesmanship of the Portuguese political class, plus the capacity from the sides of companies, brings opportunities to grow and to prepare. Intentions can be realised, leaving no failures as so often in the past, and ensuring there is no repeat of the rendezvous with history. This time it is written in the future.

As a final question – why did the European Parliament vote massively in favour of the introduction of Labels of Origin use obligation on textile goods in Europe? Is the final decision 'lost' in some drawer in Brussels? ■

David Forrester Zamith is is CEO of Ruy de Lacerda & Cª

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WHEN SCIENCE MEETS PRINTING

Peter Kiddell gives the reasons why understanding adhesion is essential



Peter Kiddell

Most of us go through our careers in print trusting that there is an ink system available that will perform as we want on the substrate. When we look at a printing process we see the equipment the substrate, and the wet then dry ink. What impresses us most is the machinery because it is the biggest part of the process. Then as printers we consider the ink we should use, how we will dry and cure that ink and the condition of the substrate before during and after the printing process. When we need to determine the quality of the finished print we use our own eyes, magnification, scratch testing, abrasion resistance testing and other electrical and physical tests depending on the application.

Machinery manufacturers emphasise speed, size, quality and cost per print. At exhibitions such as FESPA we see amazing designs on a vast range of substrates with salesmen speaking about the most recent developments of their equipment and its technical superiority to the competition. Very rarely do you hear of people speaking about what is actually happening in the printing process. To most of us printing is like



Figure 1: Dyne pens (Courtesy of www.dynetechnology.co.uk)

watching an IPL cricket match without any understanding of the laws of cricket – just players running around a field, and the crowd getting very excited about their antics. In print a machine converts substrate from a plain finish to something that either looks attractive, provides information or serves some other purpose.

PHYSICAL AND CHEMICAL LAWS

The question that needs to be answered is: “What are the physical and chemical laws that govern the printing process?” Once we have an understanding of these then, and only then, can we recognise how we can influence the printing process. There is a cause for every problem that occurs. Often it is a matter of incorrect machine set up or poorly maintained equipment. When it comes to a break-down in adhesion of ink to the substrate or deterioration of the ink film then the issues are likely to be much more obscure.

It is rare that there is a fault in the actual formulation of the ink when it comes from the supplier. How it is stored or mixed by the printer is much more likely to be the cause of problems. It may simply be the wrong ink for that particular application or not dried and cured correctly. If you are buying ink from a reputable supplier there will be chemists carefully formulating the ink and skilled production staff maintaining quality from batch to batch. If you are buying the cheapest ink from an obscure manufacturer then there may be issues of formulation and production errors. If the ink quality is compromised you are in real trouble and you have no chance of controlling the process or predicting the printed result.

Before we look more deeply into this topic let me make it clear I am not a scientist and this is not a scientific article. I am a printer who has to understand the science of print to

get the best from the process. You notice that up until now I have not specified a particular process because what is to be discussed is at an atomic and molecular level which makes specifying the particular process irrelevant. Whether it is screen-printing, digital printing, pad printing, lithographic printing, flexographic printing, etc, the same rules apply.

RECOGNISING AND AMELIORATING THE VARIABLES

Surface chemistry is an area of science that influences every aspect of life from simple bacteria to the most advanced theories in quantum mechanics. If it is in the physical universe surface chemistry will be involved. So, having built it up it is only fair to say that the theories that govern the topic are theories not facts. Every formula that has been produced has unknown variables. As printers our aim has to be to recognise where the variables are and ameliorate them. We are helped by the fact that most printing is an optical illusion, for example process colour is made up of cyan, magenta, process yellow and process black. When printed in dots of a particular orientation and size and viewed from a suitable distance we see a full colour image. Of course this optical illusion applies to digital display technology where the transmitted colours are green, red and blue, but it is not digital display screen technology that is the focus of this article. It is in industrial printing applications where printing is part of a manufacturing process that the optical illusion aspect is irrelevant. The physical and chemical characteristics of the dried and cured film are the key factors. For industrial applications the drying and curing phase can be crucial in the condition of the finished film. This is a whole new topic area that will be considered separately in another article. The same principles apply to process

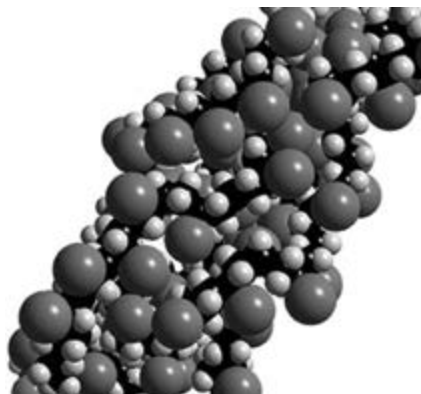


Figure 2: Non-polar – polypropylene

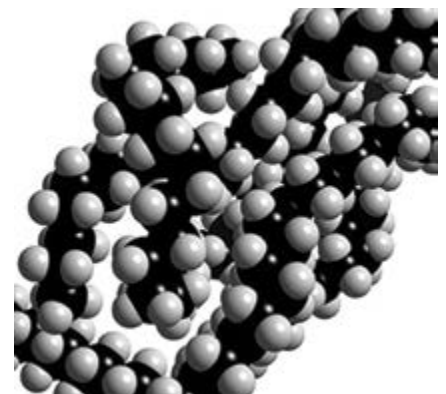


Figure 3: Polar – poly vinyl chloride PVC

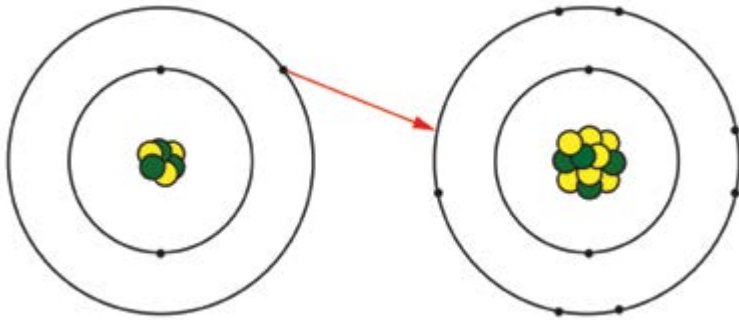


Figure 4: Ionic bond

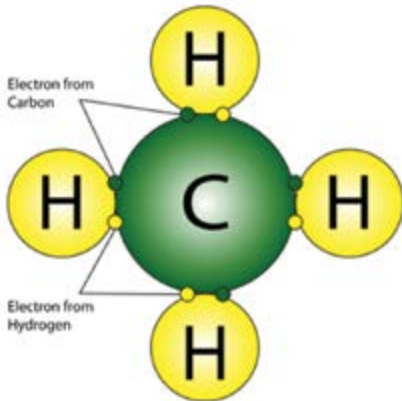


Figure 5: Covalent bond

and line colour printing so don't stop reading just because your business is not in the industrial printing sector.

A COUPLE OF DEFINITIONS

Cohesion: the condition where molecules of the same material are attracted to each other
 Adhesion: the condition where molecules of different materials are attracted to each other.

For ink to adhere to a substrate the forces creating adhesion on the substrate have to overcome the forces of cohesion in

the ink. Molecules of a liquid will naturally be attracted to each other and, in a zero gravity situation, demonstrate this by forming a perfect sphere.

For adhesion to occur the ink must be able to come into close contact with the substrate; in printing we know this as 'wetting' the substrate. This wetting is to do with the relationship between the surface energy of the substrate and the surface tension of the ink. The surface energy of the substrate must be higher than the surface tension of the ink. Again in print we measure or indicate this with 'dyne pens' or contact angle measuring devices (Figure 1).

The difference should be better than 10 dyne cm (mN/m.) Sometimes this difference occurs naturally but in other cases it is necessary to pre-treat the substrate to increase its surface energy. This is done using flaming, corona discharge, plasma treatment or occasionally, but not recommended, chemical pre-treatment. If this form of pre-treatment is the careful application of a primer, for example in printing certain textiles, then it is quite acceptable. It is the application of aggressive solvents in an uncontrolled

fashion that is to be avoided. For some substrates, which naturally are not wetted by the ink because of their low surface energies, such as polyethylene and polypropylene, there are inks which can be formulated with very low surface tensions that will adhere to these substrates. These special inks are limited in application as they are not always resistant to water and other solvents.

These polyethylene and polypropylene are also known as non-polar as opposed to polar, and examples of such materials are shown here.

Polar	Non Polar
PVC	Polypropylene
Styrene	Polyethylene
ABS	PTFE
Acrylic	EVA
Polycarbonate	PET

A non-polar material means that there are not the opportunities for molecules from other materials to bond, because there are no free electrons to become attracted to (Figure 2).

A polar material (Figure 3) has a type of covalent bond between two atoms in which electrons are shared unequally. Because of this, one end of the molecule has a slightly negative charge and the other a slightly positive charge. (See below: Chemical and Dispersive Adhesion.)

Having achieved satisfactory wetting of the substrate by the ink the process of adhesion then has to occur. These are:

CHEMICAL ADHESION

Where atoms of the two materials swap or share electrons (known as ionic bonding or covalent bonding, respectively). (Figure 4 and Figure 5).

Continued over

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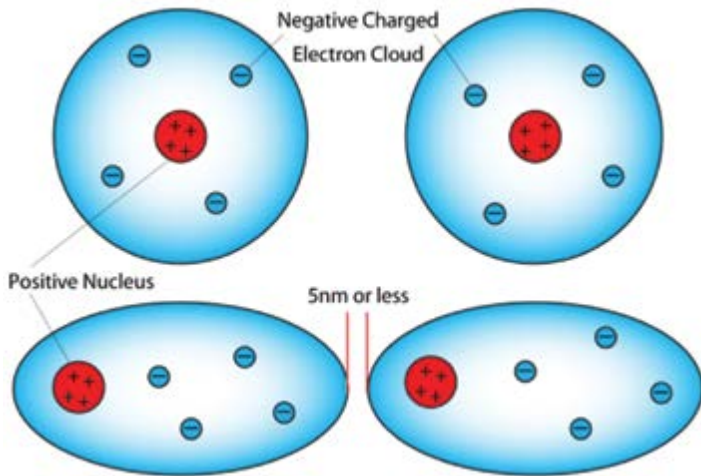


Figure 6: Van der Waals forces



Figure 7: Diffusive adhesion



Figure 8: Mechanical adhesion

DISPERSIVE ADHESION

Van der Waals forces – the attraction between two molecules, each of which has a region of slight positive and negative charge (Figure 6)

DIFFUSIVE ADHESION

This may occur when the molecules of both materials are mobile and soluble in each other (Figure 7).

MECHANICAL ADHESION

Adhesive materials fill the voids or pores of the surfaces and hold surfaces together by interlocking (Figure 8).

From the above assertions it can be seen that adhesion can be affected by the exchange of electrons between atoms (chemical), the effect of static electricity between molecules (dispersive), the solvent qualities of the ink (diffusive), and the roughness of the surface of the substrate (mechanical).

It must be remembered that the adhesive properties apply to the relationship of the ink to the substrate whilst the ink is still a liquid. But, once it has dried and cured, there is another key characteristic that is interfacial tension.

INTERFACIAL TENSION

Once the bond between the ink and the substrate is formed there is another force that will affect the integrity of that bond. This is interfacial tension. When two materials come together they give up their surface energies to form an interface. The adhesive energy is that which holds the materials together whereas the interfacial tension is leftover from the original interface that works against the adhesive energy. It is this that determines the

likelihood of the bond breaking if it subjected to physical stress. An example of this is when an ultra-violet cured ink breaks away from the substrate if the ink film is bent or cut through.

The relationship between ink and substrate is unlike most other chemical reactions. In the first instance the ink is often a mixture of liquids and solids that has been attracted to the substrate for the printing mechanism to take place. Once in contact with the substrate and still liquid it is needed to stabilise and not continue to flow. The ink then changes from a liquid to a solid and has to form a permanent bond with the substrate. All during this time the electrons on the atoms of the materials within this material combination are moving between atoms changing the forces of attraction and repulsion. The volume of ink changes and inks and substrates expand and contract at different rates. The addition of heat energy accelerates these changes.

HOW TO ACHIEVE GOOD ADHESION

The question to be answered is what can be done to have the best chance of achieving good adhesion?

- Make sure the substrate is clean before printing.
- Ensure that the substrate is at the temperature of the print shop before printing.
- Mix the inks precisely by weight.
- Try to use as many of the forms of adhesion as possible to form the final bond.
- The two most predictable are diffusive adhesion and mechanical adhesion.
- If pre-treatment is required to achieve chemical and dispersive adhesion be aware of the characteristics of the pre-treatment methods.

- Take advice from your ink supplier.
- Never use inks that are out of date.
- Ensure that drying and curing methods are set correctly and the time required for a complete cure is kept to.
- A roughened surface will provide a better bond than a gloss surface.
- Generally the application of heat will improve adhesion.
- Where solvents in the ink can dissolve/soften the surface of the substrate a better bond is likely.

Now you have a better understanding of adhesion you are a lot closer to having a predictable bond between the substrate and the ink. Whether an ink will withstand mechanical abrasion, be chemical resistant, will maintain its colour over time or be safe to use in contact with foodstuffs, is another area for consideration. The finished chemistry of a dried and cured ink film is the key characteristic in this context and is more predictable than the constantly changing relationship of the liquid ink and solid substrate.

Whether digital or analogue printing, until you have some understanding of the science behind printing only then will you be able to continuously improve the process. ■

This article originally appeared as a feature on FESPA's website at www.fespa.com

Peter Kiddell is a Director of FESPA UK Association

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IMPLEMENTING THE 6 RS

Chuck Nall explores the visualisation for an effective conservation strategy

In the United States the Environmental Protection Agency reports that many landfills are closed simply because they are full or they are contaminating ground water. As much as 70% deposits to these landfills could be recycled. Well over 90% of the world's screen-printing shops are small businesses with 50 or fewer employees, with most operated by active owners. Implementing an effective and practical conservation program for a screen-printing business starts with a visualisation of this strategy. Visualisation helps remind all employees of each business's commitment to conservation and corporate responsibility.

There are many versions of the 6 Rs. Generally they follow these principles:

- **Rethink:** Do you really need this product? Can a better process or product be implemented?
- **Refuse:** Avoiding purchase of environmentally burdensome materials whenever possible, as products with over-packaging.
- **Reduce:** Reduce waste material, by

analysing process and proper yield.

- **Re-use:** Re-use waste material without processing, as containers from one area that can be used in another area of the business.
- **Reform:** Re-use materials in a different form
- **Recycle:** Materials are sent to centres for regeneration.

Over the last 20 years this list has changed from four to five to six principles. For employees to 'buy' into your corporate vision they must understand each principle as it makes sense to their job. While someone in purchasing can understand their purchasing function, they must understand the implementation and use of the item to make the best conservation decision in their purchasing. Again purchasing is faced with not just a low cost provider decision. Communication of the corporate vision has to be decimated and understood by all employees.

It is best to think of these principles as a timeline from rethink through recycle. Each employee should be encouraged to look at

each process they are involved and how it affects the 6 R's timeline. Management should empower and encourage input of the principles to create unique 'best practices' for each individual business.

Sounds simple, right? Management will need to communicate these principles clearly to all in the business. Then ask managers to solicit observations from all employees. Simple right? Actually – too simple. At some point all owners, managers and supervisors realise that experienced employees will know the details and execution of every task. These are the people actually doing these tasks each day. Now the really simple part. Ready? Ask employees how they would implement these principles best. Ask how they would improve their daily processes. It should come as no surprise that not only will employees 'buy into' this programme, you will see things you would never see without the vision and input of your experienced employees.

The pay-off for ownership is the inverse relationship these principles have to cost savings. Avoidance of products is the easiest and least expensive form of conservation and is best done at the top of the strategy in the ReThink and ReFuse phases. The Reduce, ReUse and ReForm phases of the strategy address recycling decisions, recovery of energy and treatment of materials. The final and most costly decisions address containment and proper disposal. The inverse relationship is that the least costly items are made and the beginning of the 6 Rs as they reduce the amount and number of costlier items made at the bottom of the 6 Rs.

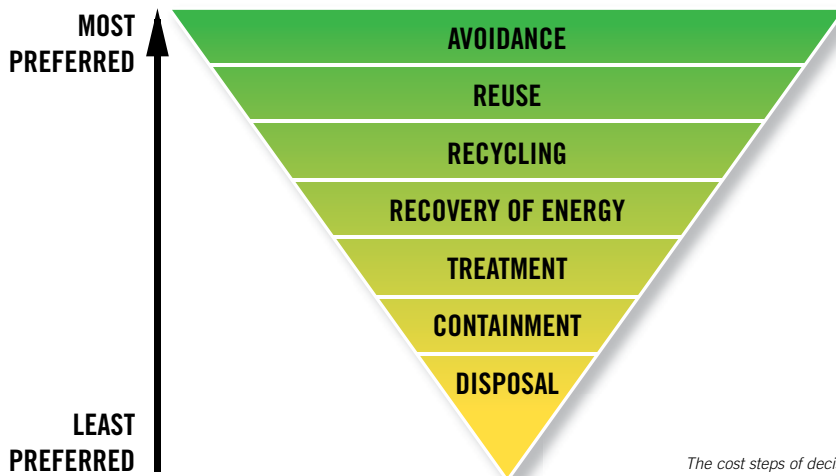
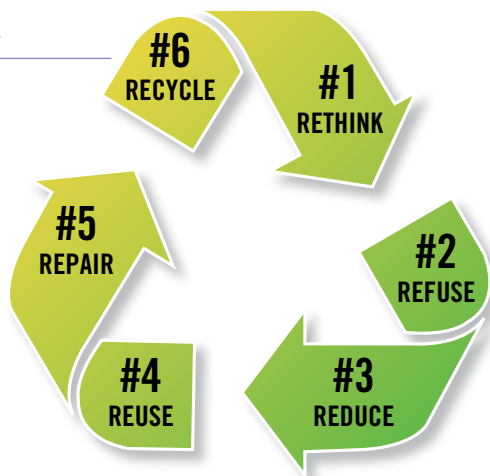
We have known and heard of the 6 Rs for years, but they are merely a 'catch-phrase' for most businesses. School age children are taught these, too. The visualisation strategy takes the form of posters throughout all departments as reinforcement to all employees. It serves as a reminder to all employees that they are on the front line of a conservation company. Encourage communication of ideas by employees. Using simple visuals posted throughout your departments bring a continual invitation of employees to participate in the conservation success of your company. Are the 6 Rs part of your daily business practices? ■

Chuck Nall is involved with Business Development at Easiway Systems

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The conservation steps of the 6 Rs



The cost steps of decisions

A SUBSTANCE OF VERY HIGH CONCERN?

Gabriele Heller comments on the classification of HDDA



Gabriele Heller

HDDA (Hexane-1,6-diol diacrylate) is contained in many UV curing printing inks. It is used as monomer (reactive thinner) because of its high reactivity and strong diluting power, as well as its excellent adhesion to various substrates.

The classification of HDDA according to CLP regulation as provided in the REACH registration dossier is:

- H315 – Causes skin irritation
- H317 – May cause sensitization by skin contact
- H319 – Causes serious eye irritation
- H412 - Harmful to aquatic life with long lasting effects

About one year ago, the Swedish Chemicals Agency (KEMI) did a RMOA (Risk Management Option) analysis and came to the conclusion that the skin sensitising properties are of equivalent concern as carcinogenic, mutagenic or reproduction toxicity properties, which under REACH Article 57f allows it to be considered SVHC (substance of very high concern) with the intention to substitute the substance.

KEMI provided the European Chemical Agency (ECHA) with a corresponding dossier, requiring to identify HDDA as a 'substance of equivalent concern' and thus as a SVHC. Such identification requires either a unanimous vote at ECHA level by member states or a Commission decision passed by the REACH Committee. At ECHA level, nine member states were opposed to the requirement, so now it is up to the REACH committee to decide.

HDDA'S USES AND SIGNIFICANCE

From the industries' point of view, Sweden's requirement is not justified:

- HDDA is not used in consumer articles. If UV curing coatings and inks are used in the manufacture of consumer articles, HDDA is polymerised during the curing process and thus no longer available in free form in the finished article.
- Industrial use of HDDA itself did not result in more than 100 sensitisation cases during the last 40 years. All known cases indicated that the skin reactions were completely reversible within two weeks. No scarring or permanent damage occurred.
- Since workers' education and, thus, wearing of personal protective equipment at the workplace today is usual behaviour in industry, no significant numbers of new cases are to be expected for the future.

CONSEQUENCES OF IDENTIFICATION OF HDDA AS SVHC

- Possible inclusion of HDDA into ECHA's candidate list, officially only resulting in information obligation on the presence of $\geq 0,1\%$ HDDA in a product sold, but according to last years experience also in customers' requirements for confirmation of none-use.
- Possible inclusion of HDDA into REACH Annex XIV. In this case any further use of HDDA is required to go through the REACH authorisation process – a time-consuming and expensive procedure.
- Opening the door for other acrylic monomers. As all low molecular acrylated substances are known to have a sensitising potential it can be easily foreseen that other acrylates will go the same way. As UV technology in printing is based on acrylics, the result to be expected in the long run is the death of the whole technology. ■

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

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APPOINTING THE EXPERT TEAM

For all who seek advice on printing for industrial applications, entering new market areas or adopting digital printing strategy, ESMA launched the Expert Team at drupa 2016. Representing the association's members and technology partners, the team received dozens of appointments at ESMA Lounge to share their expertise in printing requirements for specific market sectors.

As technological solutions move ahead and mature, we cannot forget that it is not technology that the printers buy. They buy features and benefits that technology enables – cost-savings, better business practices or optimised resource planning. The crucial questions are therefore: "How can the technology users turn a profit with machine, ink or software innovations? How will they use the innovative power of print?" To answer these questions, ESMA has appointed the Expert Team, a platform of consulting, advice and the first contact point for business- and technology-related issues.

PART OF THE MANUFACTURING PROCESS

"Today, screen- and ink-jet printing technologies play an ever increasing role in industrial applications, where printing is part of the manufacturing process of an end product. ESMA is widely recognised as being the leading provider of technical knowledge and expertise in this exciting industry segment. Through our conferences we already deliver valuable content to members, printers, manufacturers and brand owners. With the introduction of the ESMA Expert Team we further intend to strengthen our position as the leading information source by providing focused



One of the Expert Team sessions that took place during drupa

advice, training classes and consultation to our members, their clients and the industry," explains Oliver Kammann, incumbent chairman of ESMA and one of the team members.

During the drupa show, the Expert Team consisted of Roland Biemans (covering topics such as print shop work-flow and new business development), Jochen Christiaens (speciality chemistry and turning from analogue to digital printing for various applications), Frank Eirmbter (advanced materials and printed electronics), Steven Harnie (digital textile printing), Oliver Kammann (colour management and profiling for industrial decoration), Philipp Klinger (ink development and RIP software), Steve Knight (ink-jet ink, chemistry and system design) and Lucien Moons (business innovation and digital transformation). They will now be joined by Professor Fritz Bircher from the iPrint Institute and further additions to the team are welcome.

With more expert articles to follow in future issues of *Specialist Printing Worldwide*, we invite you to read the expert contribution overleaf from Oliver Kammann. All printing professionals who want to benefit from advice can submit their questions via the ESMA website or write to experts@esma.com ■


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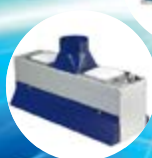
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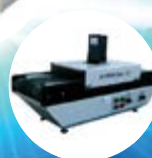
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COLOUR MANAGEMENT FOR INK-JET PRINTING ON HOLLOW ARTICLES



The challenges and solutions are detailed by Oliver Kammann



Oliver Kammann

As the ESMA conferences on the subject have amply demonstrated, direct container printing using digital ink-jet technology is turning into a market segment with considerable growth opportunities. A number of machine manufacturers have in recent times introduced printing machines targeted specifically at directly decorating hollow-ware, tubes, cosmetic containers and other three-dimensional articles using ink-jet as a means of applying graphics onto the container surface. Substrates for these products comprise various plastics, rigid and flexible, metal and glass. Whilst the mechanical intricacies of transporting these articles at speed through the printing machine and depositing the ink onto the substrate with a very high degree of precision and repeatability have been largely solved by the manufacturers, colour management for direct container decoration still remains a mystery and a challenge to equipment manufacturers, printers and converters.

While direct container decoration is not a new technology – screen and pad printing have been used for many years in the decoration of drinking glasses, tableware and plastic containers – the vast majority of products today are decorated by means of applying a label or shrink sleeve. Labels and sleeves are mostly produced using offset or flexographic printing technologies and are usually aimed at mass markets with large quantities of label material produced for any particular design.

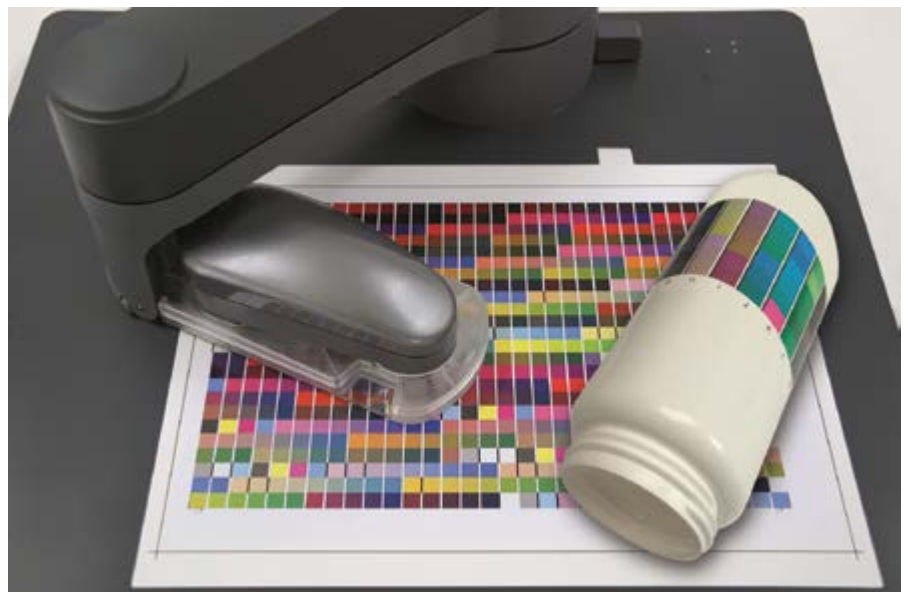
SKILLS AND TECHNOLOGIES

Usually, printing these labels or sleeves is performed by dedicated offset or flexographic print service providers (PSPs) who possess the skills and technologies necessary to produce high quality label stock. Offset and flexographic printing processes used for the production of labels and sleeves are at a very mature development stage as far as printing technology and colour management are concerned. Printing inks, curing, pre-treatment, ink deposition, substrate adhesion – all these aspects have been researched and standardised in depth. A plethora of software, hardware and work-flow systems exists that enables machine manufacturers and printers to control the deposition of ink and the appearance of colour. Colour indices, gamuts and output profiles (ie the range of printable colours on any given substrate with a certain ink set and printing technology) are well defined, and profiles for the creation of colour correct artwork files are standardised (eg the ISO 12647-2 standard for offset printing). To a certain extent, this also holds true for screen-printing applications. In all three cases, inks for process and spot colour applications are readily available and the predictability of the final artwork poses no challenges anymore. The printed labels are then shipped to the converter who 'simply' needs to apply the printed label onto the surface of the

articles, using dedicated application machines. So very little knowledge about colour chemistry and colour management is needed at the converter's end, since all colour-critical tasks have already been handled by the dedicated print service providers.

TREND FOR MASS CUSTOMISATION

The emergence of disruptive digital printing technologies such as ink-jet or toner-based systems and the trend towards mass customisation (ie frequent image changes and smaller order sizes whilst running at production speeds) is causing a shift both in the ability to produce finer half-tone graphics directly on the substrate surface and by enabling integration of printing technology at the very end of the production chain at the bottle filler or distributor. The traditional PSP is no longer an integral part of this process. It is very important to note that this also means that skills and knowledge regarding the entire digital print process and colour management need to be transferred to companies or production stages that previously have had very little or no exposure to the specific tasks and requirements. Even the manufacturers of digital printing machines are in many cases lacking in-depth knowledge and skills as far as colour chemistry and management for inkjet printing processes are concerned.



Colour measurement on paper stock and bottles – the challenges are obvious



Oliver Kammann at drupa 2016

It is a common misconception that digital printing is an easy 'push-of-the-button' process. The fact is, however, that the achieved quality of any digital print is dependent upon a whole range of parameters and variables, which need to be understood and tightly controlled in order to achieve the desired output. These parameters and variables include, amongst others, pre-treatment of the substrate surface by flame, corona or anti-static alteration, controlling the temperature of the substrate and ink, optimising nozzle waveform and droplet size jetted onto the substrate, defining curing and pinning strategies to achieve the desired ink laydown, developing ink chemistry so that a fluid remains jettable yet achieves good bonding with the substrate, controlling droplet spray and precise deposition and controlling the airflow between the nozzle and the substrate to avoid droplet flight and shifting. And, even if all these factors have been accounted and optimised for the desired application, there still remains the fact that we need to create colour profiles for each ink/substrate combination so that the artwork (which originally is usually built and thus profiled for printing on offset or flexographic presses) still retains the intended visual appearance when jetted onto a certain container substrate (which might be quite different to standard paper or foil stock). To make things further more complicated, this profiling ideally needs to be done directly on the three-dimensional article.

PROFILING CHALLENGES

One distinct feature of printed labels and sleeves is that all colour application and, therefore, also colour measurement is performed on a flat substrate, usually paper or foil stock. Spectrophotometers to measure targets for profiling are standardised instruments and most RIPs have in-built profiling technologies for quickly achieving highly accurate colour profiles. One could say that this technology is quite mature with very little advances or new developments necessary. If one wants to profile a new set of inks for a given substrate, the process simply involves printing out a range of

target files, measuring the individual colour patches (usually an automated process as well) and generating the profiles. The spectrophotometer is placed directly onto the flat surface and a measurement of a particular colour or a whole range of colours can be performed with ease. Most spectrophotometers are designed to shine a light source directly onto the substrate at an angle and measure the reflected light perpendicular to the substrate. To generate a profile of good quality, hundreds of individual colour combinations must be measured, with bigger targets easily reaching 1,000 and more colour patches. Since each patch needs to be of a size suitable to the aperture of the measuring device (eg 5 x 5 mm), all patches together quickly reach the size of an A4 or A3 page. Whilst this is no challenge as long as one prints onto a flat paper substrate, profiling, for example, directly onto a beer bottle with its very limited 'real estate' for the application of colour patches, becomes a real problem. Furthermore, no readily available spectrophotometer on the market is specifically designed to be used with non-flat articles, as the geometry of aperture, substrate and optics and the process of emitting and capturing the light from round surfaces simply has not been intended for this purpose. On glass or PET, for example, printed colours (even with an underlying thick coat of white ink) are not totally opaque, causing a lot of light emitted by the spectrophotometer to pass straight through the substrate and not reflect back into the optic, leading to erroneous readings and a wrong colour measurement. So what does one do? For certain materials like flexible plastics it may be possible to cut the bottle into strips after printing and place them flat onto a carrier surface for measuring, but this is neither practical in an industrial sense nor feasible as soon as the substrate is more rigid like ABS or glass. Further, most profiling software applications on the market today expect the printed target to be of a certain pre-defined format with usually all colour patches being placed onto a single or a

few sequential sheets. The limited dimensions of a bottle or tube already limit the amount of colour patches that can be applied. The printable area is further defined by the width of the ink-jet head or head array. So to generate a sufficient quantity of colour patches for profile generation, quite a number of bottles may have to be printed and measured consecutively. Very few software solutions today are able to fully customise the generation of colour targets both in terms of target geometry and number of patches or patch arrays required – still leaving the question of what to measure them with.

COLOUR MEASUREMENT METHODS

In our opinion, what is needed is a new way of measuring colours accurately and quickly, without the need for direct light reflection, ideally in-line with the printing and/or filling machine itself. This may also mean that we have to think 'outside the box' in order to develop applications, hardware solutions and procedures targeted directly at the challenges of direct digital decoration of three-dimensional articles made from any type of substrate. We already see demands from brand owners who not only demand quick and accurate profile generation directly onto the substrate, but to also consider the filled container as the final profiling substrate, as the liquid inside may also have an adverse effect on the visual colour appearance.

We are closely consulting and interacting with manufacturers, printers and brand owners to help develop, implement and provide training for technologies and devices which comply with these requirements and with those that still may arise as this new decorating technology is adopted by an ever increasing number of users. ■

Oliver Kammann is Owner and Managing Director of K-Flow and Chairman of ESMA

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Contributions from other ESMA Experts such as Roland Biemans (LMNS), Jochen Christiaens (Inkjet Consulting Christiaens) and Steven Harnie (Printrix) will appear in future issues of Specialist Printing Worldwide. Subscribe now at www.specialistprinting.com to receive future copies.

WHAT'S NEXT FOR WIDE-FORMAT PRINT?

FESPA
profit for purpose

Roz McGuinness sums up the impact of digital's versatility across industry sectors



Roz McGuinness

As we celebrated the tenth anniversary of FESPA Digital in Amsterdam in March, it was clear that the growth in digital wide-format printing we anticipated when we set up the show has indeed turned out to be explosive, enabling new applications and creating opportunities. However, with digital print still accounting for less than 20% of the overall global print market today, the scope for further growth is enormous.

Certainly, while walking around the show floor at what was our largest ever digital event, it was clear that when it comes to opening up new markets, we've only seen the beginning of what wide-format digital print can do. Visitors and exhibitors alike had stories to tell about how they're developing new applications and business models that have the short-run, print-on-demand and variability capabilities of digital print at their core.

PRINT YOUR WORLD

Whether you were looking at wallpaper printed with photography, intricately patterned ceramics or furniture that corrects acoustics, one theme pervaded the RAI exhibition centre throughout the four days of FESPA Digital 2016 – wide-format digital print technology is no longer just for visual communication applications; it is now having a real impact in industry and in both commercial and home environments.

The boundaries between application and customer segments are blurring and wide-format digital print today is integrated



FESPA Digital 2016's exhibitors highlighted the appeal of digital production across different segments

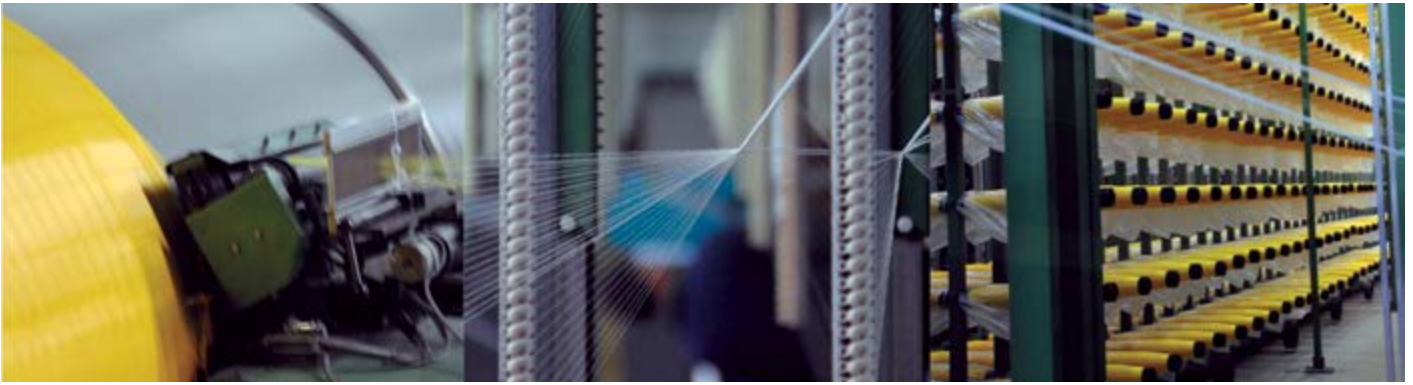
throughout a broad spread of different sectors. Throughout the show there were examples of manufacturers and print service providers working creatively to find new ways to use print. It's clear that the future is one of endless possibilities.

INDUSTRIAL INNOVATION

Many of the innovative applications we saw at FESPA Digital this year could be classified as 'industrial print'. From a bamboo-effect bicycle and customised clothing to kitchenware, paper furniture and photo-quality flooring, digital print is rapidly becoming an essential part of the manufacturing process.

It has a strong appeal for industrial applications, with its suitability for just-in-time production making it ideal both for reacting to trends in real time and managing stock levels through print-on-demand. This is one of the reasons that industrial print is tipped to be one of the big growth areas for wide format digital print over the coming decade. Projections suggest that the market will be valued at over \$100 billion within the next two years, more than double its 2013 value. Certainly, the volume of specialised substrates, inks and software solutions that we saw showcased at FESPA Digital reflected industrial print's growing importance in the market.

Continued over



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REFLECTING DESIGN TRENDS

Many applications that fall under the 'industrial printing' umbrella are growing in popularity for corporate, hospitality and home interiors, something that was clear to see from the tremendous visitor interest in Printeriors at FESPA Digital 2016. In the Printeriors Café we saw the walls of an art gallery transposed onto the floor using digital print across a variety of substrates, while photographs printed on the walls of the café gave people the chance to enjoy a 'window' view of the city of Amsterdam from inside the RAI.

One of the goals of Printeriors is for the wide-format digital print community to build bridges with the design community. From the way that current design trends were reflected in the printed rooms throughout the show, I think that this is certainly happening. Reflecting the popular 'rough luxe' trend, for example, there were numerous applications in which printed effects mimicked a raw material so well that people actually felt the need to walk up and touch it, just to check it wasn't really the marble or wood that their eyes told them it was. There were also numerous examples of the seamless gradations between colours and patterns that are achievable with digital print, while custom-printed furniture and wallpaper reflected the growing consumer demand for customisation.

FAST PRODUCTION OF SHORT RUNS

Whether you were looking at interiors, signage, textile, industrial or garment printing applications at FESPA Digital 2016, it was clear that the ability to quickly adapt to changing trends is a big driving force behind digital print's increasing prominence. Wherever you looked, equipment manufacturers were highlighting the appeal of digital production for fast and high quality printing of short runs, enabling production of one-off items or making it possible to produce small quantities to avoid overproduction. There was also a lot of emphasis on automating work-flows, something that we saw in everything from software solutions and digital cutting through to full end-to-end equipment line-ups. Both point to a growing move toward more agile business and production models.

ENABLING DIVERSIFICATION AND INSPIRING CREATIVITY

Diversification has become something of a watchword for the wide-format digital print sector and I think that this was visible at FESPA Digital this year in everything from product launches to the spectrum of different industries from which our visitors came. We saw exhibitors showcasing software solutions, substrates and inks developed for specific

applications, while equipment manufacturers expanded their entry-level offerings to open doors for print businesses that have previously not been able to offer textile printing, direct-to-garment printing or thermoforming.

However, while technological innovation is one of the factors driving diversification, it's the creativity of the wide-format digital print community that turns technological innovation into real-world applications. Based on what we saw at FESPA Digital 2016, I believe that the combination of diversification and creativity will shape the future of the industry over the next ten years. I am certainly looking forward to seeing how much growth areas such as textiles and interiors have developed by the time we host our Global Expo, FESPA 2017 in Hamburg (8 to 12 May 2017) – based on current growth rates I expect that FESPA Textile and Printeriors at that event will be very exciting indeed. ■

Roz McGuinness is Divisional Director at FESPA

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THE PACE OF INTERCONNECTIVITY



Ford Bowers looks at the effects technology has on market influences



Ford Bowers

Science teaches us that a requirement of life is for constituent parts to come together, or aggregate, while death is the dissolution of those bonds. In this light, and reflecting on what was on display at drupa 2016, we are involved in an industry that is, indeed, vital in every sense of the word. Interconnectivity is happening at an astounding pace, at many levels and among many different constituent parts.

There is, as would be expected, a continuation of work-flow integration. There also is adaptation of technology into new formats designed for various outputs. What struck me most, however, was the number of partnerships among traditional and digital OEMs to expand offerings and penetrate new markets. This has grown considerably in the past few years and no doubt will continue to do so. It reminds me of the global automobile manufacturing model, in which no car can truly claim to be 'made' in any single place or country. Technological advances are charted; constituent parts are made in various locations around the world. They're incorporated and assembled into larger aggregate parts somewhere else and, finally, these larger parts are collected and assembled into the finished product. Adapting this model for the imaging industry, print-heads, print engines and presses – with various input and output adaptations – are able to be developed for various markets and applications much more rapidly. It's a veritable blossoming of technology.

PLATFORM INTERCONNECTIVITY

Not to mention the interconnectivity offered via platforms built for individuals and companies to engage in high-value exchanges of information and experiences, without necessarily having a corporate moderator in the mix. You see this in user conferences hosted by OEMs, on-line communities offered by the same, and the welter of traditional and social media efforts that collectively inform and direct attention to this, that or the other.

Yet, this new interconnectivity, or life, is not without its challenges. On the producer side, adaptation will continue to be key, but partners may develop competing interests that eventually conflict. And, while no fault is generally assigned, dissolution of bonds can be painful and set back progress for one party or another. On the other end, consumers of information exchange should be wary that they do not involve themselves in a single – or worse, a closed – loop of information. This diminishes the

ability to read reality as it is, rather than how one wants it to be. A variety of sources is an important, though admittedly time consuming, bulwark against allowing trends to pass by unnoticed.

In the end it comes down to understanding your part and place in the process, and making an effort to connect – and to be connected with – that may well determine your livelihood in the years to come. ■

Ford Bowers is President & CEO of Specialty Graphic Imaging Association

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BUILDER OF RACE ENGINES CHANGES TRACK TO DEVELOP HIGH PERFORMANCE BUSINESS

Screen-printing proves to be the fastest growing production segment

John Fitzgerald, owner of Letters and Graphics by Fitz, is a hard worker with a sharp eye for precision and high-performance equipment. For nearly 30 years he worked as a master mechanic for one of the leading racing engine builders on the east coast. "I built all types of engines – NASCAR-Busch series, dirt-track, sprint-car, dirt-modified, drag-racers, race-boat, even racing lawn mowers," he explains. "I used to work 120 hours a week, sometimes four days straight. Eventually, I burned out and about eight years ago took a regular, full-time job as a mechanic for a large corporation near my home."

At that time Fitzgerald also saw a part-time business opportunity producing vinyl lettering for race-cars, so he built a shop behind his former home in rural Delaware. Starting with a vinyl cutting machine, he soon added a large-format vinyl printer. When customers saw the quality and creativity of his work, they began asking for printed T-shirts.

COMPARING SCREEN-PRINTING EQUIPMENT AT TRADE SHOWS

"I wanted to be a one-stop shop and decided to add screen-printing," states Fitzgerald. At one show he found what he wanted, and purchased a Vastex V-2000, six-station press. Then he took the three-day training course at



At the heart of Letters and Graphics's shop is a V-2000 six-station press, which John Fitzgerald has found accurate, sturdy, and reliable

Vastex headquarters in Allentown, Pennsylvania, and attended several screen-printing classes offered by the company. "The training courses were fantastic. Any time I have a question, I can call the guys from Vastex and they help me out," he adds.

"The V-2000 is easy to adjust with its six-way screen levelling. It's user friendly," Fitzgerald continues. "I've been using it steady for five years and never had anything wear-out

or had an issue with it. I've done quite a few six-colour jobs, and it's a very accurate and sturdy press."

RELIANCE ON PIN REGISTRATION

Fitzgerald relies on the Vastex Pin Registration (VRS) system for registering screens off-press to increase productivity. "On multi-colour jobs, you can get them lined up very close with VRS before you locate the screens onto the press.



Fitzgerald supplied the graphics and built the 875 hp engine for this dirt-modified race car, outfitted for a 'Run What You Brung' race at Delaware International Speedway



The infrared conveyor dryer's 76cm wide belt handles larger garments



The Dri-Box II infrared conveyor dryer allows drying of water-based inks



Having pre-registered screens off-press using the pinboard (left) of a Vastex pin registration system (VRS), the system's pallet jig (on press) registers six screens of a multi-colour job



The Vastex flash cure unit partially cures ink to avoid offsetting between colours, increasing both image quality and production rates

Further information:

Vastex International, Inc, Allentown, PA, USA
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 web: www.vastex.com

Once you get it on the press you may have to make half a turn on the micro-control knob – and that's it."

He owns almost every press accessory that Vastex makes, including ones for yard signs, jackets, and pocket attachments, and for printing can-cosies six at a time.

Initially, he purchased a small EC1 infrared conveyor dryer, but then he began doing water-based discharge printing and needed longer cure-times. So he added a Vastex Dri-Box II, a 76cm wide dual-heater infrared conveyor dryer. "With the bigger dryer, I can cure twice as many shirts per hour which is really productive," Fitzgerald says. "Every day I also use my P180-18-120 Vastex Flash Cure unit to cure between colours and avoid smearing when printing the next colour."

TAKING A GROWING BUSINESS TO THE NEXT LEVEL

Five years after starting his business, Fitzgerald estimates that 80 percent of his work is screen-printing, and the fastest growing segment of his production. With the expansion of screen-printed T-shirts, customers began asking for hats so he added embroidery. He bought a direct-to-garment printer, but most of what he does now in garments is screen-printed. Besides clothing, Fitzgerald offers signs, vehicle lettering and graphics, mugs, tote bags and photo banners in sizes up to 1.2 x 6m.

Fitzgerald's business has been so busy that he outgrew his Delaware facility. He has taken the next step and moved Letters and Graphics by Fitz to Rhode Island where he can benefit from an alliance with a signage firm.

"I love doing this work. My wife says I am the pickiest person in the world, especially with equipment, but that's a good quality in this business," Fitzgerald concludes. ■

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GIS supports new Ricoh MH5220 print-head

Global Inkjet Systems (GIS), a leading developer of software, electronics, user interfaces and ink supply components for industrial inkjet systems, has announced that it supports the recently launched Ricoh MH5220 print-head.

The MH5220 is the latest addition to the Ricoh printhead range with 600dpi native resolution, 1,280 nozzles and a sub drop size of 2.5pl with four grey levels. Configured with 4 x 320 nozzles and a print width of 54.1mm, the MH5220 can jet up to two colours/head with UV curable inks and is targeting high resolution label, packaging and wide format graphic applications.

The GIS Head Interface Board (HIB-RH-1280) provides access to all the standard MH5220 print-head settings, including waveform control for binary, greyscale and multi-pulse printing. The GIS electronics are designed to deliver data and precision DAC-controlled waveforms at the higher jetting frequencies and slew rates required by the MH5220 head.

"This small drop 600dpi head is an important addition to the Ricoh family of industrial printheads and we expect rapid adoption in the market," comments GIS CEO, Nick Geddes. The GIS HIB-RH-1280 Head Interface Board for the Ricoh MH5220 is available now to OEM/system builders and integrators. ■



The GIS HIB-RH-1280 supports the new Ricoh MH5220 print-head

Nazdar receives Champions of Business award from Kansas City

Nazdar states it was honoured to receive Kansas City's distinguished Champions of Business Award on 10th May 2016. The award honours companies that 'set the gold standard for financial performance, innovation, and community involvement.'

President of Nazdar, Michael Fox, accepted the award. He credited Nazdar's continued growth to the company's ability to adapt to changes in the printing industry. He also made sure to thank the entire Nazdar team, without whom, he said, the company's success would not be possible.

Fox closed by expressing Nazdar's gratitude for the Kansas City community: "In 1995, we moved our headquarters from Chicago to Kansas City, because we knew that this was a vibrant community and a place where we could find the talent to be able to make Nazdar successful over many years. We're very proud to be part of a winning community here in Kansas City, and thank you all for this honour." ■



Nazdar's Champion of Business Award

Zünd says new D3 cutter is the new standard in productivity

With its D3 cutter, Zünd has brought to market a new, dual-beam system for high-volume, industrial applications. Together with Zünd Cut Center (ZCC), the new cutter is part of a complete cutting/finishing solution that claims to offer the ultimate in performance and productivity from pre-press to final product. Depending on job characteristics and cut contours, the new Zünd D3 is capable of doubling the throughput.

The new Zünd D3 cutting system is largely based on the proven technology of the G3 series. This means precision cutting accuracy across the entire working area, maximum modularity, and user-friendly operation. Additionally, the D3 is capable of handling an equally wide spectrum of materials and, because of its flexibility, it is an ideal solution for mass customisation and consequently, perfect for meeting the requirements of Industry 4.0.

The significant gains in productivity made possible with the D3 are primarily due to the series' dual-beam construction with twin beams operating independently and simultaneously in one efficient production work-flow, and each beam carrying up to three different tool modules. Depending on the specifics of the job, this can result in twice the throughput of the single-beam system.

To meet a variety of production needs, D3 cutting systems are available in four different sizes ranging from the D3 L-3200 with a working area of 1.8 x 3.2m up to the D3 3XL-3200 with a working area of 3.21 x 3.2m.

Consistent with Zünd's modular design concept, its D3 cutters can be adapted any time to meet changing cutting requirements. New tools, modules or automated load/off-load devices can easily be added to an existing configuration. Zünd Cut Center completes the D3 cutting system with end-to-end digital production work-flow, making it suitable for high-volume industrial production environments. ■



Zünd's new D3 dual-beam cutting system

Hönle Group looks back on a successful drupa

The drying experts of Hönle Group – Hönle, Eltosch Grafix, PrintConcept und Aladin – have all agreed that drupa 2016 was a success. Following the general trend, the companies noticed a reduced attendance, but actual visitor contacts were extraordinarily good. In addition to concrete requests, staff had many interesting discussions which should lead to joint research projects and, ultimately, to new drying and curing systems – the show highlights of the forthcoming years.

This time the general interest was focused on UV-LED technology. The spotlight was especially on LED Powerline Focus, a powerful UV-LED system with modular design that allows the switch-off of single segments and a particular focusing optic. It was especially developed for sheet-fed offset printing. Another highlight was LED Powerline Flexo, compact and with integrated control, which is suitable for flexo printing applications. Also in the visitors' focus was jetCURE LED, a highly intensive curing unit, which combines the merits of a technically mature curing concept with the known advantages of LED technology.

Additional highlights were the two Hönle Group drupa parties, which were extremely well attended. With music, Bavarian beer, exotic cocktails and culinary delicacies, business partners, associates and staff celebrated the 40th anniversary of Dr Hönle AG as well as a successful exhibition. ■



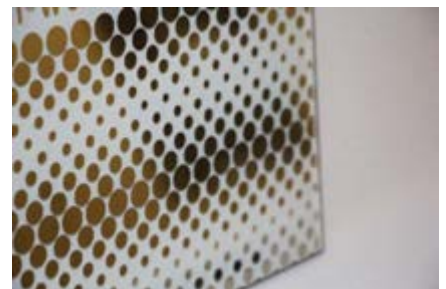
Visitors, partners and staff celebrate the 40th anniversary of Dr Hönle AG

Ink-jet resist for partial sputtering (PVD)

KIWO's newest innovation in its product portfolio of resists and coatings is an ink-jet resist for partial sputtering (PVD). Sputtering, also called magnetron sputter coating, is the removal of precious metal atoms, such as platinum or gold, in a vacuum chamber by energetic ion bombardment, to coat a substrate with the sputtered metal particles. This coating has mainly functional uses and is common for heat reflection with architectural glass. The same application method is used for decorative sputter coating of architectural glass where the decorative sputter coating and the metallic deposition is applied partially and not over the entire surface.

This new resist is compatible with large format digital printers for the flat glass industry and opens up many new opportunities.

This latest product was featured on the Kissel + Wolf and Ulano joint booth at drupa where it showed three product ranges of screen-making chemicals, adhesives and resists and coatings. Both companies said the stand was well attended – both from existing customers, as well as from many interested visitors, with numerous national and international guests. Particularly pleasing was the number of visitors who were interested in the product portfolio of the resists and coatings. ■



KIWO's newest innovation is an ink-jet resist for partial sputtering

Mutoh takes up distribution agreement with Summa

Mutoh Belgium, Mutoh's EMEA distribution centre for Mutoh wide-format printer equipment, has entered into a distribution agreement with Summa Europe, Belgian manufacturer of vinyl and contour cutting plotters and flat-bed cutters. Under the terms of this agreement, Mutoh has been appointed as non-exclusive EMEA distributor for a selected number of Summa vinyl cutters, including the SummaCut series (D60, D140 and D160, with 60cm, 135cm and 158cm cutting widths) and SummaCut D140FX (135cm cutting width) drag knife cutters and the S-Class 2 160T (1.58m cutting width) high end tangential cutter.

These Summa cutter models will be marketed alongside Mutoh's existing ValueCut series of drag knife cutting plotters and will be

distributed to Mutoh's EMEA wide network of authorised resellers through Mutoh Belgium and Mutoh Deutschland. The company will ensure the distribution, sales, marketing, training and after-sales support towards its reseller channel.

"We are delighted to cooperate with the best known brand for vinyl cutting plotters in the industry and to extend our product range with a number of Summa cutters," says Nick Decock, Mutoh Belgium's Commercial Marketing Manager. "The Summa cutters represent a great match for our high quality and multi award winning ValueJet series sign & display printers. Our ambition is to offer professional, productive and fully integrated dual-device print-to-cut workflow solutions. With the combo ValueJet printer and

SummaCut vinyl cutter, we will be able to further exploit our dual-device print-to-cut philosophy, by offering two separate systems which offer a higher degree of flexibility, better tracking, higher accuracy and last but not least a much better productivity versus integrated print-and-cut systems."

"We are very pleased to cooperate with the industry pioneer and today's market leader for eco-solvent wide format printers," adds Geert Pierloot, Summa's Business Development and Marketing Manager. "The reputation of Mutoh's Japan-built ValueJet printer line is very strong in the market. Our co-operation with Mutoh offers us the possibility to extend sales opportunities for our cutting plotters to Mutoh's extensive network of experienced sign and display resellers." ■

New collaboration and partnership for Xaar

Xaar has announced its collaboration with Global Inkjet Systems (GIS) to deliver and sell drive electronics and ink supply systems optimised for the Xaar 5601 family of print-heads. The two companies have worked closely together on the development, testing and production of these industrial standard systems components.

Optimised for the Xaar 5601 print-head family, the Head Management Card (HMC) and ink supply system will unlock the full capabilities of the Xaar 5601. These are a value-add for OEMs, freeing them up from time-consuming in-house developments and enabling a quicker time-to-market. The Head Management Card and ink supply system for the Xaar 5601 are available from both Xaar and Global Inkjet Systems.

"During the development phase of the Xaar 5601 print-head family we evaluated a number of potential companies to partner with for the systems components," says Ramon Borrell, Chief Technology Officer at Xaar. "We chose GIS because it has a successful track record in systems components supply and also provides high levels of technical expertise."

"We are proud to have been selected by Xaar to collaborate with their team on this project," adds Nick Geddes, CEO at GIS. "GIS's next generation of the Head Management Card is perfectly suited to the high performance capabilities of the Xaar 5601. We are excited about the future potential of this technology."

Xaar has also announced a strategic partnership with Ricoh to maximise the benefits from each company's considerable expertise in Thin Film piezo printhead development. The collaboration between Xaar and Ricoh will deliver superior technology and a broader range of print-heads which will provide substantial benefits to the customers of both Xaar and Ricoh.

The announcement comes at an exciting time for Xaar, whose Bulk piezo ink-jet technology is already at the heart of an enormous number of industrial printing systems in a wide variety of applications around the world. Xaar's collaboration with Ricoh relates to new technology and products developed for a number of its new Thin Film piezo print-heads. The first product which has benefited from this partnership, the Xaar 1201 GS2p5, was featured on the Xaar booth at drupa. ■

CCI takes green steps to make the planet a better place

CCI is joining the ranks of big corporations in reducing carbon footprint by taking steps to reduce its dependence on the grid with solar panels. The company recently has also invested in a desert landscape to conserve water usage.

CCI has advanced its initiative in sustainability by installing solar photovoltaic (PV) panels from Sunthurst Energy. Solar power is one of the most important solutions to reducing global warming pollution by using a renewable energy source. It decided to make the investment in solar power to reduce and stabilise energy costs and to be good stewards of the environment by utilising clean energy. The addition of these panels is expected to provide savings of approximately 80% in energy costs yearly with a six-year payback period.

"This solar power purchase agreement is a win-win for CCI," explains Daniel Boren, President of CCI. "Not only are we helping to reduce the carbon footprint, but it is a good return on investment." ■

Vastex's new Little Red X1 and X2 dryers are digitally controlled and expandable

An all-new Little Red X Series of mid-capacity infrared conveyor dryers with digital controls and expandable drying chambers has been introduced by Vastex International. The new Little Red X1 and X2 dryers are the smallest and fastest digitally controlled dryers on the market, according to Mark Vasilantone, president.

The X1-30 model, equipped with a 76cm wide conveyor belt and a single infrared heater of 120V/2000W or 240V/2600W, can cure up to 130 plastisol-printed images or 45 discharge-printed images/hour, and is reportedly the only drier of its size with digital display of both temperature and belt speed.

The Little Red X2-30 model, which can cure up to 260 plastisol-printed images and up to 90 discharge-printed images/hour, is equipped with dual 240V/2600W heaters, a longer conveyor belt and digital controls. A powered exhaust system that cools the outer cabinet while evacuating moisture and fumes is standard on the X2 model and optional on the X1 model.

Capacity of both models can be increased as needs grow by adding additional heating chambers, extending the belt length and increasing the infinitely-variable speed setting of the digital belt control. The heaters, which carry a 15-year warranty, measure 30 x 61cm and feature closely spaced coils that provide high-density, medium-wavelength infrared heat for

maximum cure speed without cold spots or under-curing associated with conventional units.

A precision temperature control, belt control with digital display, and diagnostic display are housed in an industrial control box that sits on top of the chamber to reduce overall width, and is protected from heat by ceramic insulation. Both models are equipped as standard with a low-friction roller belt aligner and an infrared focusing system that allows infinite belt-to-heater height adjustment between 50 and 175cm, plus angle control for optimum results. Optional on both models are additional heating chambers, conveyor belt extensions, heavy duty conveyor belt motors and locking castors. ■



Vastex's new Little Red X-2-30 model has dual heaters

Most powerful, scalable, water-cooled LED curing solution from Phoseon

Phoseon has introduced its the next generation FireLine FL400 LED curing solution, its highest power water-cooled light array with peak irradiance up to 20W/cm². The new solution is scalable to support custom length options, and offers exceptional optical uniformity for consistent and reliable curing.

The new solution is designed for the most demanding printing, coatings and adhesive curing applications. Joe Becker, Product Marketing Manager at Phoseon Technology, states: "The FireLine FL400 offers customers a reliable, high-performance solution for jobs that require high UV output. The new solution is IP54 rated for maximum protection to withstand even the harshest environments." ■



Phoseon's FireLine FL400 LED curing solution

Design is simplified with new online ArtiosCAD Display Store

Esko is expanding the quick-start business opportunities available to its customers via an online portal with the launch of the ArtiosCAD Display Store. Available to Esko customers for use with ArtiosCAD, Studio and Kongsberg, the ArtiosCAD Display Store has been created in conjunction with long-term business partner B+B International and delivers a wide array of production-ready, resizable designs based on an extensive online library of proven parametric design templates.

"We are very excited to work with B+B International in launching this new service," states Richard Deroo, Esko Product Manager. "With the proven success of their customers in Italy, I am confident that our global customer base will see the value in this online display store. B+B International has been an Esko reseller for many years and had already started to develop a local online library. We are working with them to build on this success, bringing this valuable solution to a global audience."

Creating parametric design standards is typically a complex process that requires advanced design expertise and product knowledge. Whilst ArtiosCAD's Resizable Design Tools enable users to create their own parametric design standards, it can be a complex process for many companies.

With the ArtiosCAD Display Store sign and display converters can access a library of more than 325 resizable and tested display designs. It is quick, simple and eliminates the need for structural and 3D design expertise.

Getting started is easy. Users visit Esko's web site and view the continuously updated library. The designs are available on a pay-per-download basis, ranging from 15 Euro to 75 Euro and the use of downloaded designs is unlimited. Each design bundle includes a resizable ArtiosCAD 2D production ready drawing for repeat use, an ArtiosCAD 3D drawing that can be used for dynamic quality inspection and evaluation, a 3D PDF fully interactive 'virtual sample' PDF for sharing with colleagues and customers, a 3D JPG image file complete with detailed report template and a 3D animated movie. ■

AWT's Accu-Glide features new optional counterweight print arm

Now available with an optional counterweight print arm, AWT's small-format Accu-Glide one man squeegee unit offers an inexpensive, yet high-quality solution to screen-print short runs, prototypes and test runs. The optional print arm ensures consistent print stroke quality and reduces operator fatigue.

The aluminum Stay-Flat vacuum table provides a flat, warp-proof printing surface. The vacuum hold down is powered by a maintenance-free quiet vacuum motor, claimed to be the quietest in the industry. Vacuum on/off is easily controlled by the upfront hand lever system.

The small-format Accu-Glide is manufactured using AWT's reliable products including the redesigned Big Gripper screen frame clamping unit, with increased stability for precision micro registration control, heavy-duty Sidekick reversible screen lift, and ergonomically shaped all-aluminium contoured squeegee holder. The squeegee holder comes with AWT's top-of-the-line Poly-Supreme Vulkollan squeegee blade. Adjustable legs allow the vacuum table height to be adjusted for operator comfort and ink control.

Other optional features include manually adjustable air-flow to vacuum, a spare parts' package, and conversion to 50Hz. With its enhanced print-stroke quality and ease of operation, the optional counterweight print arm makes the Accu-Glide an even more attractive addition to screen-printing operations. ■

Kiian Digital's Digistar Hi-Pro series is awarded Nike's restricted substance list certification

JK Group has announced it is officially listed as a Nike-approved ink manufacturer through its Kiian Digital brand. The Digistar Hi-Pro series from Kiian Digital has been awarded Nike's Restricted Substance List (RSL) Certification following its compliance with the global sports brand's rigorous regulations to meet or exceed worldwide legislative requirements, and is now licensed by Nike, Inc for use in its substantial supply chain.

As the world's largest manufacturer of athletic footwear and apparel, producing more than 900,000 products a year, Nike aims to eliminate hazardous chemicals throughout its production chain. Its RSL requires that every Nike-branded product, including shoes, apparel, accessories and equipment from Converse and Hurley and Nike Golf, adheres to its sustainability commitment. This demands that its suppliers evaluate their chemical impact and incorporate fewer polluted manufacturing processes that comply with a comprehensive list of chemical standards. In terms of sublimation inks, these are subject to annual tests to ascertain the absence of a number of chemicals including organotins, PVC and Volatile Organic Compounds (VOCs).

Verified by qualified laboratories, including the Bureau Veritas, as adhering to Nike's exacting chemical criteria, the Digistar Hi-Pro series is a high-performance sublimation solution for fashion apparel, endurance sportswear, equipment and household textiles due to its ability to produce striking, high-quality graphics across an array of textile and rigid materials. Consisting of 14 intense and vivid colours, this range is fully compatible with next generation Epson piezo print-heads,



Kiian Digital's Digistar Hi-Pro range is now an official Nike-approved ink

offering excellent image quality, precise colour reproduction and quick drying.

The Digistar Hi-Pro inks enable existing users to perfect designs early and allows accelerated time-to-market as these approved products do not require additional testing. For print companies looking to increase their commercial opportunity, the series opens the door for them to be considered as an official Nike supplier as it guarantees that all the prints conform to the company's RSL requirements.

"We are very pleased to announce that our Digistar Hi-Pro range is an official Nike-approved ink and fully compatible with Nike's RSL benchmark," says Marco Girola, Kiian Digital Marketing Specialist. "This highlights our long-term ethos of a sustainable business approach, not only for us as an ink manufacturer, but also in providing solutions that allow our customers to offer more environmentally acceptable products."

Kiian Digital's advanced portfolio comprises water-based inks that allow for increased productivity while reducing waste. With an expansive chain of regional dealers, the company embraces a business model of printing locally, thereby potentially eliminating the need for global shipping and further reducing its carbon footprint. ■

Summit aims to spotlight rise of digital print in corrugated packaging

The shift towards digital print in the corrugated packaging industry will be in the spotlight at a star-studded conference to be staged by FESPA UK Association in the autumn. Leading names in the sector have already thrown their weight behind the Digital Print for Corrugated Packaging Summit, which will be held at the Williams Grand Prix Conference Centre in Oxfordshire on 5 October.

Lead sponsors for the event are HP with other headline sponsors being Swanline Print, Esko, British Converting Solutions Ltd (BCS) and Smurfit Kappa. FESPA is supporting the event.

The summit will feature 'must-see' presentations from key people within the corrugated packaging industry, who will share their insights and knowledge on a range of critical topics. The presentations will focus on knowledge and information and be aimed at providing benefits for delegates' businesses. The key-note address will be delivered by the internationally renowned designer and speaker, Silas Amos.

There will also be a range of compact displays showcasing some of the leading suppliers to the short run packaging industry, and valuable networking opportunities throughout the day. The summit is only open to printers, converters, specifiers and end-users.

On the evening before the summit, FESPA UK Association will be holding a unique Williams Experience event which will include a drinks' reception in the largest private collection of Grand Prix cars in the world, and dinner. There will also be the opportunity to test driving skills in an F1 simulator, the car driven by Jenson Button and Ralf Schumacher in 2000, and play on a pro-size Scalextric. ■



The Williams Experience precedes FESPA UK's corrugated packaging summit

Kornit and FIT design collaboration produces 'Wearable Water' designs

For the third year in a row, Kornit Digital and the Fashion Institute of Technology (FIT) have been collaborating on a unique project, challenging students to create designs to be printed digitally onto fabric, in a sustainable manner.

The project has been focusing on encouraging textile/surface Design students at FIT to create original designs applying different concepts. This year's selected theme is Wearable Water. The theme highlights the importance of one of the Earth's largest and most important ecosystems, its oceans. And, for the first time since this project began, students were able to watch in person as their designs were printed locally on the Kornit Allegro at Papilio Prints in New Jersey.

The first place was awarded to Jihee Che for her design 'The Sulawesi Sea: Save the Coral Reefs'. According to the designer, the piece is supposed to remind people of the seriousness of environmental pollution and endangered species. In the Sulawesi Sea, 50% of coral reefs are affected by bleaching which might significantly impact many species living in that area.

Second place went to Janisha Biyanwila for 'Water: An Inconvenient Truth', and third place to Rachel McGuire for 'Blended Bycatch'. Paige Leonard received an honourable mention.

As the textile industry keeps being challenged about environmental concerns, this project provides students with strong, first-hand insights as to how the Kornit Allegro is revolutionising textile production, while still enabling creative use of design and colour.

The designs were judged based on use of theme and sustainability, marketability, use of digital technology, and overall design aesthetics by Melissa Niederman, Art Director of The Style Council, Tom Cody of his own design company, Joe Castaldo, President of The Style Council, and Nancy Fire, Creative Director of Design Works International. Representing Kornit North America were Paul Borucki, Managing Director,



Jihee Che's winning design in the Kornit Digital and FIT collaborative challenge

Jim Manelski, Business Development Manager, and Marco Paul, Strategic Accounts Manager.

In addition to cash prizes, the winners will have their fabrics replicated as fashion items that feature strong eco-awareness and demonstrate how this can be successfully incorporated in the reproduction of greener garments. Additionally, the finalists' designs will be featured in Kornit's booth at the upcoming SGIA Expo in Las Vegas in September. Over the summer, FIT's Fashion Design students will compete in a contest utilizing this year's Textile Design submissions to create a finished garment.

The Kornit Allegro incorporates the company's NeoPigment inks and prints onto multiple fabric types with 100% sustainable results. Its integrated fixation process removes the need for pre-treatment, steaming or washing, making it a truly environmentally friendly solution that meets the most rigorous environmental regulations, including Oeko-Tex Standard 100 certification and GOTS (Global Organic Textile Standard) approval. ■

Avery Dennison to acquire Mactac Europe

Avery Dennison has announced a definitive agreement to acquire the European business of Mactac from Platinum Equity, a California-based private equity firm, for the purchase price of €200 million including assumed debt. With 2015 year-end run-rate revenues of €147 million, or approximately \$170 million, and approximately 470 employees, the business is a leading manufacturer of high quality pressure-sensitive materials, serving several high-value segments, including graphics, specialty labels and industrial tapes. Mactac's core product lines complement Avery Dennison's existing graphics portfolio.

"The acquisition of Mactac Europe enhances our competitiveness in high-value graphics, where we have sustained above-average growth over the past few years," says Dean Scarborough, Avery Dennison chairman and CEO. "Known for high product quality and outstanding service, Mactac complements our existing business with a strong brand and loyal customer base, expanding our product offering, capabilities, and distributor network." ■

Konica Minolta uses drupa as its entry into industrial printing markets

Konica Minolta says it celebrated major advances made into new industrial printing markets such as labels and packaging, as well as numerous sales of digital printing and software services during drupa. Initial results from the trade fair exceeded its expectations set prior to the event.

This year the company saw an increase of about 25% more visitors at its stand than in 2012. A prominent showpiece at Konica Minolta's 2,400 square m booth was the AccurioJet KM-1, making its debut as a commercially available product. This was intended to show visitors how breakthrough technology can help them diversify into new markets such as books and packaging, or serve their existing markets better. The first two orders from a list of prospects for the AccurioJet KM-1 were confirmed during the show – from US

companies PostcardMania and Cohber Press. These contracts, together with several orders for the bizhub C71cf label printer, represent Konica Minolta's first successes in the industrial printing segment.

In addition, Konica Minolta's strong position in the mid-production colour printing sector was strengthened as customers from across the world placed orders, underpinning the company's impression of an extremely positive overall mood and investment climate during the show.

Konica Minolta's partnership with MGI Digital Technology was another highlight of the stand at drupa, with the French company's JETvarnish technology being shown working in conjunction with several Konica Minolta systems like the AccurioJet KM-1 as well as the bizhub PRESS C71cf label printer. ■



Konica Minolta's sizeable presence at drupa 2016

Roland scores twice at the EDP Awards

Two of Roland DG's recently launched wide-format digital print devices, the TrueVIS VG Series and SolJet EJ-640, have won EDP Awards. Jerry Davies, President EMEA for Roland DG, accepted the award for 'Best wide format print & cut solution' for the TrueVIS VG machines and 'Best wide format roll to roll printer up to 170cm' for the SolJet.

Speaking at the ceremony, which took place at drupa in Düsseldorf, Davies commented: "It's an exciting time of innovation for the digital wide-format print industry, with keen competition driving the release of new products. The EDP recognition demonstrates that Roland DG technology continues to lead the way, offering an award-winning combination of quality, durability and overall return-on-investment." Since 2007 the EDP Association (European Digital Press Association) has evaluated and celebrated the best new developments in print production, annually presenting awards to the very best solutions in the industry.

The TrueVIS VG Series is the culmination of Roland's many years of market-leading expertise in the field of integrated eco-solvent print-and-cut technology, combined with a host of new enhancements. These include four newly developed FlexFire print-heads to deliver precise, high quality print at production speeds and new Greenguard Gold certified TrueVIS ink which works in synergy with the printheads to optimise output.

Roland's new SolJet EJ-640 eco-solvent printer has been designed with cost-efficient and high-performance productivity in mind. With dual staggered print-heads, an integrated tri-heater system and strong chassis, the EJ-640 is built for optimum performance for businesses working on high-volume output. ■



Jerry Davies receives one of his EDP Awards

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Sun Chemical opens state-of-the-art production facility in Turkey

Sun Chemical has opened a \$30 million production centre in Aliaga, Izmir in Turkey dedicated to serving the growing demand for solvent-based flexible packaging solutions. The 50,000 square m site employs more than 90 staff and is dedicated to the production of solvent-based inks serving both local and international customers.

The multi-million dollar investment provides a brand new state of the art production facility, which is fully automated with the latest

equipment and technology to ensure consistent and exceptional ink quality.

Traditionally manufactured at Sun Chemical's Çigli site, alongside its water-based inks, the move to Aliaga for solvent ink production is driven by increased demand from Turkey and the Middle East for solvent-based flexible packaging products. The company has split the sites to provide dedicated premises for both its solvent and water-based products. The Çigli plant will continue to manufacture water-based inks for the local markets.

States Arinç Aktan, General Manager at Sun Chemical Turkey: "The new facility in Aliaga will be a hub for our solvent-based inks serving customers directly as well as other Sun Chemical sites in Turkey, the surrounding territories and the Middle East. Splitting our solvent and water-based plants means that we can meet the increased demand from the flexible packaging sector and serve both sets of customers efficiently." ■



The opening of Sun Chemical's new Aliaga site in Turkey

EXCELLENT BUSINESS DEALS CONCLUDED IN AN OUTSTANDING INVESTMENT CLIMATE

Decisive impulses for the global print industry manifest themselves in Düsseldorf

The atmosphere at drupa 2016, acknowledged as the world's biggest and most important trade fair for print and cross-media solutions, can hardly be topped – the investment climate is extremely good and has far exceeded all expectations. As the eleven-day trade fair drew to a close the 1,837 exhibitors from 54 countries unanimously reported excellent business deals, extremely promising contacts and a positive spirit for the global print industry.

The re-positioning of drupa and its focus on future themes with strong growth potential – such as 3D, functional and packaging printing – is proving to be a real asset. Be it publication, commercial, packaging or industrial printing – technology offers matching solutions for all of



Around 260,000 visitors from 188 countries visited drupa 2016

these applications while opening up new lines of business and business models at the same time. "The print industry is constantly re-inventing itself and offers a wealth of high-potential facets. And this is precisely what drupa 2016 has very impressively proven," explains Claus Bolza-Schünemann, Chairman of the drupa Committee and Chairman of the Board at Koenig & Bauer AG. "We were able to experience a highly innovative industry here in the 19 exhibition halls, one that has succeeded in moving out of the 'valley of tears' and grasping the future by the neck."

THE TRADE FAIR OF DECISION MAKERS AND CAPITAL SPENDERS

Some 260,000 visitors from 188 countries and some 1,900 journalists from 74 countries travelled to Düsseldorf to learn about technology innovations, further developments and new business lines. Visitors' decision-making competence was extremely high – approximately 75% of all visitors were executives and in a decisive and or co-decisive capacity when it came to capital expenditure in their companies. Various other indicators produced by the visitors' survey also underscored very clearly that drupa is a flawless B2B trade fair and platform for business decisions:

- 54% of visitors came to drupa 2016 with concrete investment intentions
 - 29% placed orders during drupa
 - 30% are planning to place their orders after drupa
 - 60% found new suppliers at drupa
- The development in visitor attendance

(2012: 314,248) reflects the world-wide consolidation occurring in the industry. This is why visitors' high decision-making competence produced a particularly positive effect, all the more as one in two visitors expected their companies' businesses to develop very well over the next twelve months.

"Customers – with very few exceptions – no longer come with large delegations or as part of a company outing to drupa," comments Werner Matthias Dornscheidt, President & CEO of Messe Düsseldorf GmbH. "It is rather the top managers that travel to Düsseldorf today – and from 188 countries to this drupa."

Totalling 76%, the percentage of international visitors was up 16% from four years ago. This figure was attributed to Asian visitors and 17% of international visitors came from this continent alone (2012: 13.6%). And, here, India accounted for the largest share with 5%, followed by China with 3%. The leading European countries were Italy, France, the Netherlands and the UK. "This means that drupa has enhanced its global market significance and its international rating even further. It is the unrivalled global number one trade fair for the print and media industries," says Werner Matthias Dornscheidt commenting on the results of drupa 2016.

POSITIVE VERDICT FOR TECHNICAL SIDE EVENTS

Meeting with high demand was the programme of accompanying expert events with its three pillars – drupa cube, drupa innovation park, 3D fab + print, touchpoint packaging as well as Printed Electronics and

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Leading manufacturers such as Marabu presented product portfolios stretching from screen, digital and pad printing applications to highlights such as the new Plug & Print inject ink for ECO-SOL Max 3.

Solutions. One in two drupa visitors was interested in the various special shows and lecture theatres. drupa cube, the event and congress location, was received particularly enthusiastically and almost 3,500 visitors flooded into the cube over the eleven trade fair days in order to find out about a plethora of topics.

In particular high demand were the keynotes by Frans Johansson (founder and CEO of The Medici Group), Silas Amos (founder of Silas Amos Ltd. Design Thought) and Shane Wall (Chief Technology Officer HP And Global Head of HP Labs). The Creative Day, organised by Messe Düsseldorf in cooperation with W&V which addresses marketers and creative workers in particular, was even sold out. And the C-Level Sessions specifically targeting executives were also fully booked.

Meeting with a very positive response was the drupa innovation park that focused on innovative business models in addition to technology innovations from renowned exhibitors. On display were ready-to-market applications for augmented reality in field service and in advertising but also successful examples for multi-channel campaigns. The crucial insights from the content-driven dip 2016 – print creates content and added value.

AN EXPERIENCE FOR ALL

drupa does not stop at the gates of the exhibition centre. Instead, Düsseldorf presented itself with a versatile programme as an attractive trade fair destination for all things drupa, be it an exhibition or 3D event, discussion forums or a 'rolling lab'. drupacity allowed thousands of interested visitors to experience the trade fair themes – live and hands-on right in the city centre – providing both drupa visitors and exhibitors with tangible added value and a concept that is truly 'one of a kind' worldwide.

"Our concept of bringing the drupa themes to the city thereby making it possible for people to understand and experience technology has paid off 100%. Thanks to numerous city-centre activities Düsseldorf citizens and visitors were able relate to the trade fair themes. drupacity proved an experience for all," remarks Boris Neisser, General Manager at the trade association Destination Düsseldorf, which organised the drupacity programme. "The many multipliers from all over the world felt welcome in Düsseldorf and will return to their home countries with these positive impressions. This is 'city marketing live' representing a locational advantage not to be underestimated for our city."

As announced at the midpoint of drupa, the event will stick to its four-year cycle. The organisers have confirmed that the next show will be held from 23 June to 3 July 2020. ■

Further information:

web: www.drupa.com

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MEMBERS PRAISE DRUPA 2016 AS THE PLACE TO BE FOR INDUSTRIAL PRINTING

Düsseldorf provides platform for new areas of expertise

With the ESMA Lounge buzzing with technical talks, the Expert Team handling questions from various corners of the industry and 22 pavilion members closing deals and establishing new international contacts, drupa 2016 was undoubtedly the show for everyone involved in industrial and functional printing. During all eleven days and virtually in all 17 halls, the exhibition has confirmed the modern-day reputation of print as an integral part of numerous manufacturing processes.

"We call it 'Print in Production' as printing has truly become a production method for fluid deposition. It can serve decorative or functional purposes but the potential is similar if not greater than that of 3D printing," explains Peter Buttiens, CEO of ESMA. "Many visitors regarded ESMA as a platform for new areas of expertise and we could offer them guidance at the show

through our member companies who specialise in conductive and dielectric inks, pastes, bespoke printing equipment, EL technology and applications such as photovoltaics, NFC antennas or bio-medical." Organised for the second time at drupa, the pavilions of European Specialist Printing Manufacturers Association covered over 550 square m and included 22 members or technology partners in halls 3 and 6.

For some of them it was the first time as an exhibitor at the world's largest print fair. "The interest in functional inks, particularly Intrinsiq's range of conductive copper ink-jet inks and screen-print pastes, was exceptional, resulting in numerous new potential clients and collaborations. It was an excellent show which reached customers who do not typically attend the printed electronics events," evaluates Ian Clark from Intrinsiq Materials, one of the newcomers to drupa.

BROADER INDUSTRIAL COVERAGE

Debbie Thorp, Business Development Director at Global Inkjet Systems, adds: "drupa has always been an important meeting place, but with this year's broader industrial coverage, it has become an essential event for companies like GIS. We had a very successful show and we look forward to increasing our presence at drupa 2020."

Ink-jet technology enjoyed particularly strong exposure during the fair which was reflected in the huge interest for the upcoming edition of The Inkjet Conference, organised by ESMA on 5 and 6 October 2016 in Düsseldorf. "drupa has been a supporting partner of TheIJC since its inauguration in 2014. During the show we met many of our past delegates and exhibitors presenting new products and solutions, all confirming they'd join us again in October for further insight to the future of inkjet engineering and chemistry. In general, the ESMA Lounge at drupa was a great meeting point for those looking to the future," says Steve Knight, the co-founder of TheIJC and The Inkjet Training course. The latter, held at the iPrint Institute in Fribourg, Switzerland, attracted many of the drupa attendees by displaying and operating one of the test printer units used at the course.

STATEMENTS FROM COMPANIES WHO PARTICIPATED IN THE ESMA PAVILIONS AT DRUPA 2016:

- "For years drupa has been a must-go fair for us. Our screen-printing frames enjoy high recognition in Europe, so this time it was our objective to gain new contacts from overseas. Already in the first days of the show we have won a customer from Ethiopia." Wolfgang Lefering, CEO, Anton Hurtz
- "Both visitor numbers as well as their global spread by far exceeded our expectations. In addition, we have noticed a remarkable business optimism in terms of economic development and readiness for new investment in capital equipment. We have not seen such optimistic economic outlook since the global financial crisis and we were pleasantly surprised with some unexpected orders." Jan van Schaik, Sales Director, SPS Screen
- "PVF got good response on High Tech Micron-Screens and NBC-Mesh especially for fine line and highest dimensional accuracy screen-printing. We are ready to participate in 2020 as drupa 2016 was successful for us and we expect all ESMA members to do all efforts to make drupa 2020 a worldwide leading screen-printing innovation show." Peter Fleischer and Julia Fleischer, CEOs, PVF
- "drupa turned out to be the hot spot location for meeting the industry's decision makers and establishing the first contact. The visitors were satisfied with our concept of offering expert advice and we have got a large number of inquiries of industrial printing applications." Marcus Borghoff, General Manager, ESC
- "We had many visitors from graphic and textile applications. Many offset printers showed interest in screen-printing machines and we got interesting enquiries for our products and technical training." Paolo Parrini, Sales Director, Saati
- "It has been a key venue for us to meet customers and prospects from the various different application areas of commercial and industrial printing. It was impressive to see which leading role ink-jet printing has now taken and how the demand is growing for us to deliver high performing colour management and RIP solutions." Thomas Kirschner, CEO, ColorGATE

SCREEN-PRINTING MANUFACTURERS

Founded originally as a screen-printing manufacturers' association, ESMA dedicated a substantial part of its pavilion in hall 3 to companies which mastered this conventional technology, not least for unconventional and specialist applications. "Many visitors were certainly impressed by the massive presence of digital printing at drupa but we were able to show them that there is a whole range of high-end applications which are still only possible with screen-printing or at least require screen going hand in hand with digital," explains Jorge Ellert, Applications and Training Manager at Ulano. Manuel Zuckerman, owner of FIMOR, underlined the importance of a joint screen-printing pavilion: "If we were isolated and left on our own, we would miss a great number of contacts who would not find us or not even look for us. Anyone with an interest



All seats were taken in the ESMA Lounge at drupa 2016

in screen-printing has to come by the ESMA pavilion where the key brands are represented and this is a high value for us.”

Whether from the digital, screen and at times even offset printing businesses, ESMA Lounge welcomed visitors who came with specific questions for the Expert Team (see pages 39-41 for more details). This new initiative kicked off at the first day of drupa and, supported by a special expert publication, completed the association’s profile as a knowledge body of the industry, responsible for promotion of best practices and innovative processes. Nine experts – Roland Biemans, Fritz Bircher, Jochen Christiaens, Frank Eirmbter, Steven Harnie, Oliver Kammann, Philipp Klinger, Steve Knight and Lucien Moons received dozens of appointments which encouraged the further development of this new ESMA project. Everyone who seeks advice on all issues in the broad scope of industrial printing can visit www.esma.com/drupa/expert-sessions to learn more about the topics handled by the Expert Team and to submit their questions.

GROWING INDUSTRY AWARENESS

Considered not only the topmost printing show but also a must-attend for all who either provide industrial printing solutions or look into innovating their printing business and expanding it to new market applications, drupa 2016 was an extraordinary event. “With the growing industry awareness of new printing capabilities, the recognition of ESMA activities increases, as well. We would like to thank all member companies who contributed to the success of ESMA pavilions and all visitors who took their time to come by and learn more about industrial, functional and speciality printing. We will return with ESMA member pavilions to Messe Düsseldorf for glasstec on 20 to 23 September and K show on 19 to 26 October 2016,” concludes Buttiens. ■

Further information:

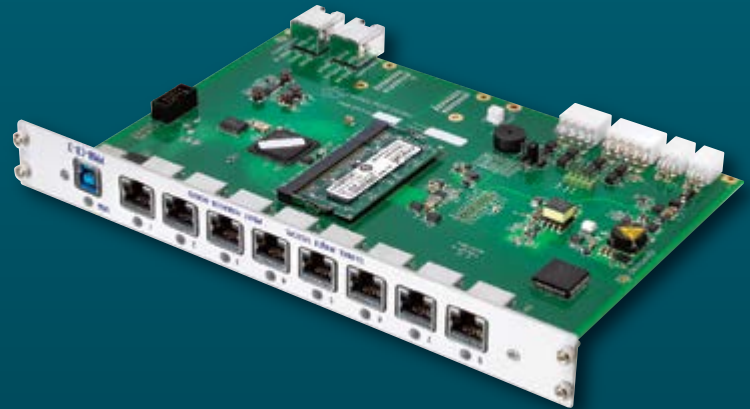
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FROM MILAN TO MUNICH

Industrial cutting-edge technology moves back to Germany for 2017

From 14 to 16 November next year, InPrint 2017 will present highly advanced printing technologies and customised printing solutions for application in industrial production. Focusing on functional, decorative and packaging printing, the specialised exhibition will showcase the latest technologies, components and services for speciality, screen, digital, ink-jet and 3D printing.

The third InPrint in Germany will once more be held at the Munich Trade Fair Centre, Germany, co-located with productronica, the world's leading trade fair for electronics development and production. Companies interested in exhibiting at InPrint 2017 can now book their stands and find all information, including the reservation form for exhibitors, on the show's website www.inprintshow.com/germany.

The exhibition profile for InPrint 2017 comprises innovative technologies, machinery and components as well as equipment, tools and services for printing on metal, plastics, foil, textile, glass, ceramics, wood and other substrates. Exhibitors at the show will include producers of printing machinery and systems, of components and special parts, of pre-press devices and chemicals, of equipment for processing and finishing, of inks, fluids and chemicals as well as providers of software solutions, materials and substrates, of services for the industrial printing sector and, furthermore, representatives from research, from trade associations and from trade publications.

ACHIEVING AIMS

Compared to the first show in 2014, the second edition of InPrint closed with not only visitor and exhibitor numbers having increased by a third (3,400 visitors, 145 exhibitors), but also the total net exhibition space (5,500 square m). In the post-show survey, 95% of exhibitors stated that they had fully or partly

achieved their aims, 89% of exhibitors had received positive business enquiries and 82% of exhibitors rated the visitor quality as good or excellent and were highly satisfied with the show.

CONSIDERABLE PROPORTION OF DECISION MAKERS

Visitors from 65 different countries came to InPrint in November 2015. The majority were of management and R&D level from the industrial printing sector, from traditional printing companies and from various manufacturing industries. The range of industrial fields included additive and advanced manufacturing, aeronautics and aerospace, appliance and equipment manufacturing, ceramics and glass, medical, rapid and regular prototyping, to name but a few. Visitors came from leading companies such as Airbus, BMW Group, Continental Automotive GmbH, Daimler AG, Hamberger Flooring GmbH, Hugo Boss AG, Kraft Foods R&D Inc., Procter & Gamble, RUAG Aerospace GmbH and Villeroy & Boch.

In addition to the 3,400 InPrint visitors, a further 1,324 visitors of the co-located productronica show made use of the offer to visit both shows with one combined ticket. More than 60 conference sessions took place on the show floor, from panel discussions to Tech Talks, and offered additional opportunities for exchange and networking between exhibitors and visitors.

Marcus Timson, founder and co-organiser of InPrint, is confident that the 2017 show will once again be an event of the highest standard: "InPrint targets print specialists from the entire industrial print supply chain who are specialised in functional and/or decorative printing and need to invest in this rapidly growing sector. In the exhibition survey for InPrint 2015, respondents who had attended both InPrint 2014 and 2015 believed the market and technology had evolved

considerably and that the InPrint Show had played a key part in this development. This feedback is a great motivation for us to design InPrint 2017 as an even more inspiring industry exhibition and as the leading platform for this fast developing market." ■

MILAN TO HOST THE INDUSTRIAL PRINT SECTOR IN 2016

InPrint Italy 2016 show in Milan, which runs from 15 to 17 November is the only exhibition dedicated exclusively to industrial print technology in Italy. Its role is to inspire the manufacturing sector with the innovative performance of industrial print technology.

The event provides exhibitors with the unique opportunity to meet focused, senior professionals searching for industrial print technology for decorative, functional and packaging printing. Exhibitors will showcase cutting edge technologies and provide technical expertise for digital, inkjet, 3D, screen and speciality printing.

Following the success of InPrint 2015, the show organisers report record bookings for its InPrint 2016 show in Milan. InPrint Co-Founder, Marcus Timson comments: "We are delighted with InPrint 2016's progress to date. The fact that this year's show has been resoundingly supported by the market is, we believe, a great sign for the industrial print sector. It also clearly underlines print's continued ability to meet the manufacturing challenges of a huge number of vertical markets."

Frazer Chesterman, Co-Founder, adds: "We chose to locate InPrint 2016 in Milan because, outside of Germany, Lombardy is the largest manufacturing region in Europe. Italy's leadership in textiles is well known, but other decorative segments are thriving in Northern Italy too. These include wood decoration and lamination, glass, plastics, ceramics, packaging and the famous Italian automotive industry. InPrint 2016 will showcase all these technologies as well the latest market leading screen-printing and digital ink-jet developments."

Further information:
web: www.inprintshow.com

USA LAUNCH SCHEDULED FOR 2017

FM Brooks, part of the Mack Brooks Exhibitions Group and organisers of InPrint: The Industrial Print Show, has announced the launch of InPrint USA which will take place from 25 to 27 April 2017 at the Orange County Convention Center in Orlando, Florida. The launch of InPrint USA follows the success of InPrint in Europe since its first edition in 2014, where it has become the leading exhibition for cutting edge technologies in the fields of industrial speciality, screen, digital, ink-jet and 3D technology print solutions.

InPrint Co-Founder, Frazer Chesterman explains: "According to a study conducted in partnership with IT Strategies earlier this year, demand for industrial printing technology has accelerated world-wide. North America is one of the world's most important manufacturing regions and a market leader in the field of industrial printing. InPrint USA brings this fast-developing community together."

THE RAISING OF BENCHMARKS

Asian importance shines through as exhibitors and visitors declare Mumbai show a huge success

The 2016 edition of the Screen Print India show, held from 6 to 8 May at Bombay Exhibition Centre, Mumbai, was declared a huge success by exhibitors and visitors alike. With more than 100 stalls and 7,000 footfalls throughout the three-day period, SPI 2016/ASGA India 2016 raised benchmarks for enhancing awareness, high-level networking, knowledge dissemination and industry bonding.

The inauguration ceremony commenced with the lighting of the ceremonial lamp. This was carried out by several dignitaries and guests from all over the globe, followed by the cutting of the ribbon to mark the exhibition opening. A traditional Maharashtrian-style music and dance marking the occasion's pomp and splendour had all those gathered cheering and trying to capture the vibrant performance with their cameras.

Immediately afterwards, Grafica Flextronica commemorated the ten years of Dhirubhai Mistry Institute for Print Education Technology, Research and Training (DMI) and also launched a new machine on the occasion, setting the trend for the next three days.

A GALAXY OF GURUS

A galaxy of global gurus conducted technical seminars and interactive sessions, adding considerable value to those who attended this show. These included Mike Young, Imagetek Consulting International of the USA, Charlie Taublieb with his unique 'Charlie's Corner' concept now popular all over the globe, Jacek Stencel, Pasja Print & Media, Poland, and Adam Batting, Technical Manager, Fujifilm Europe Graphic Systems Division.

The Screen Print India Awards for Excellence in Printing completed two decades – a memorable milestone – continuing a tradition of recognising excellence in screen-printing that started back in 1996. These 'Oscars' of the screen-printing industry in India were presented by dignitaries from across the globe.

Responding to feedback received from exhibitors, visitors and supporting



Screen Print India's ceremony including the cutting of the ribbon



Some of the dignitaries attending this year's Screen Print India

associations, the event was being held during the summer period. This made it possible for more people to exhibit and visit and the venue was selected so that large and heavy running machines could be displayed during the show.

Devang N Sheth, Director, Aditya Expositions, comments, "The Screen Print India exhibition made its debut in 1994 and has become bigger in size, wider in scope and greater in significance. It now also includes textile printing and digital printing. A co-located niche event, Sublimation Ideas Expo, also made its debut alongside, providing a focused interface to printers who are already into sublimation as well as those planning to explore the various opportunities it offers."

STRONG SUPPORTERS

The credibility factor of this dedicated platform for the screen-printing industry for the past two decades was evident from the fact that SGIA (USA), SGAI and IPAMA pledged their support. Plus, ASGA, which usually only officially supported exhibitions in China, supported SPI 2016 and held its board meeting in Mumbai, the day after the event.

Everyone knows that the screen-printing industry has tremendous potential. The need of the hour is to tap that potential and grow in tandem with the industry. Networking on a formal and informal level, keeping oneself updated on the latest developments, joining hands with new business partners, and attending knowledge seminars are crucial steps. Being at SPI 2016 provided opportunities for all this and more.

The Screen Print India shows have always highlighted the scope for growth and greater profits in the screen-printing industry. Continuing its strong traditions, SPI 2016 attracted visitors from across India as well as

delegations from countries across the globe; these represented focused footfalls that were genuinely interested in exploring business opportunities and new technologies. Screen Print India consciously strives to ensure participants and visitors are updated with the latest screen-printing industry developments through cooperation with various regional, national and international associations.

A COMPREHENSIVE VISITOR PROFILE

The visitor profile comprised leading industrial screen-printers, technicians, consultants, professionals, entrepreneurs, products or service providers to end-users who are employing screen-printing, textile printing and digital printing as a substantial part of their process. Leading brands have consistently endorsed their confidence in an established platform.

The exhibitor profile at Screen Print India 2016 encompassed technology drivers, knowledge transferees, manufacturers, distributors, dealers, service providers and allied specialists, contributing to any process of screen-printing, textile printing and digital printing.

Being held bi-annually in Mumbai since its inception, this international exhibition on screen-, textile and digital printing had made its North India debut in 2013, its Goa debut in 2014 and even moved overseas with the brand Screen Print Vietnam in 2015.

According to the event organiser, Aditya Exposition (P) Ltd of Mumbai, Screen Print India's sustained track record since 1994 provided exhibitors and visitors with much-needed confidence. This made this edition a win-win for print industry stakeholders. ■

Further information:

web: www.spi2016.screenprintindia.com

TOP-NOTCH TECHNOLOGIES UNITE IN LAS VEGAS

Products and innovation join forces to provide vast spread of diversity

The 2016 SGIA Expo will bring together the industry's widest array of qualified and educated attendees to experience the most innovative technology in the imaging industry. It will be staged in Las Vegas, USA on from 14 to 16 September and will bring top-notch technologies and a sold-out trade show floor.

Attendees get three days of wall-to-wall exhibitors with the latest products and methods on the market, as well as unlimited educational sessions with the new all-access education pass. This premier pass opens up the doors to more than 40 educational sessions throughout the duration of the Expo, all taught by leaders of each corner of the industry.

Attendees can mix and match sessions to best fit their schedules or follow one of the four educational tracks for a tailored experience. These tracks are 'Graphics and Sign', 'Garment Decoration', 'Business Management' and 'Color Management and Workflow'.



SGIA Expo returns to Las Vegas in September

INDUSTRY-WIDE RECOGNITION IN SGIA GOLDEN IMAGE AWARDS

Showcasing printing excellence across all categories, the 2016 Golden Image Competition is now accepting entries. This revered competition celebrates the imaging elite in nearly every category, no matter how complex. All submissions are displayed on the trade show floor in the Golden Image Gallery, and will be judged on Tuesday, 13 September.

Entries that earn a Gold in their respective categories are considered for 'Best of Show' (digital, garment and graphic screen-printing categories) and 'Best in Creativity' (digital printing). All entries, whether Gold winners or not, are considered for the 'People's Choice Award'.

2016 SGIA INDUSTRIAL PRINTING SYMPOSIUM

Visitors registering for the 2016 SGIA Expo can also register for the 2016 SGIA Industrial Printing Symposium to get an inside look at the latest advancements within the industrial printing marketplace. Additionally, the 2016 Printed Electronics Symposium explores nearly every facet of this growing imaging sector.

"The Industrial Printing Symposium is an opportunity to expand one's knowledge base by being exposed to industry leaders in all subjects relevant to the industrial print market," states Steve Hatkevich, Director of Research and Development at American Trim, LLC.

This day-and-a-half 2016 SGIA Industrial

Printing Symposium begins the day before the Expo and focuses on the unique challenges and solutions that affect this specific marketplace. Sessions are taught by the leaders in the community, and include titles such as 'Single-Pass Inkjet: Developments as they Affect Industrial Printing', 'Utilization of UV Curing Technology for the Industrial Printing Market', 'Exploring the Digital Decoration of 3D Surfaces', 'Exploring the Future of Industrial Printing', 'Functional Coatings: Defining the Opportunity' and 'Ceramic Tile Printing: Analog to Digital Changeover Timeline'.

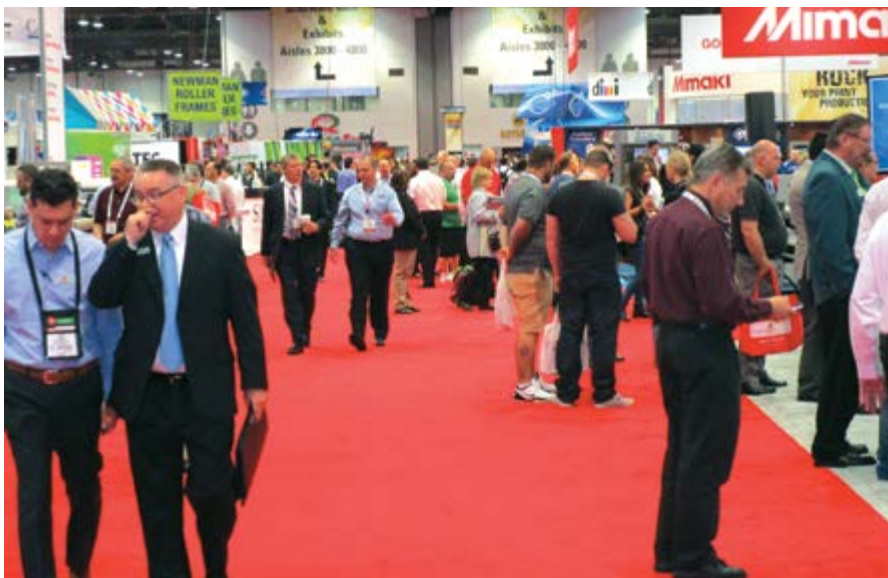
2016 PRINTED ELECTRONICS SYMPOSIUM

In addition, a day-and-a-half event and beginning one day before the 2016 SGIA Expo, is the 2016 Printed Electronics Symposium which navigates through the opportunities, applications and advancements within the evolving printed electronics marketplace, and addresses critical production processes specific to this community. Sessions are taught by the leaders in the community, and include titles such as 'Advances in Flexible Substrate Technology to Improve Resolution, Definition' and 'Accutance of Screen Printed Conductors', 'Strategic Designs for Printing Textile Electronics', 'Solutions for When Standard Connectors Do Not Meet the Requirements of Printed Medical Sensors' and 'Designing Smart Medical Devices with Force Sensing Technology'.

IPC – Association Connecting Electronics Industries has partnered with SGIA again this year to offer two education sessions during the symposium. IPC is a global trade association dedicated to furthering the competitive excellence and financial success of its members, who are participants in the electronics industry. In pursuit of these objectives, IPC will devote resources to management improvement and technology enhancement programs, the creation of relevant standards, protection of the environment, and pertinent government relations. ■

Further information:

Specialty Graphic Imaging Association,
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