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Tips of the MONTH

The greatest gifts you can give your children are the roots of responsibility and the wings of independence.

~ Denis Waitley

Forget about the consequences of failure. Failure is only a temporary change in direction to set you straight for your next success.

~ Denis Waitley

First, have a definite, clear practical idea; a goal, an objective. Second, have the necessary means to achieve your ends; wisdom, money, materials, and methods. Third, adjust all your means to that end.

~ Chinese Proverb

Success is nothing more than a few simple disciplines, practiced every DAY.

~ Jim Rohn

Better to light a candle than to curse the darkness.

~ Chinese Proverb

Future of Screen Printing

By Mustafa Kamal
CEO - Printex

The origins of screen printing can be traced back to China's Song Dynasty, a period covering the years between 960 and 1279 AD. The printing technique was introduced in the Western world in the 18th century after silk became a more popular trading commodity. The rest, as they say, is history — while screen printing continues to evolve to meet the needs of modern society. But that doesn't mean that the evolution will continue as it is today and that the future is assured.

I believe that screen printing must continue to evolve to meet new needs and demands as they develop. "The challenge, as I see it, is acquiring quality, up-to-the-minute screen making techniques and advance process training. This is specifically to meet newer complex and demanding screen-print requirements that manufacturers need to fabricate a finished product; something that is widely inadequate or entirely absence. To meet these exceptional and intrinsic printing obligations, oftentimes, either as a three-dimensional coating requirement or precise uniform ultra-thin deposition;

the screening process is taken to a new plateau in execution and performance, but the industry at this level sadly lacks the necessary skills to reach quality objectivity in an acceptable comfortable and profitable manner.

In terms of digital, it is not a battle of supremacy, but an opportunity to coexist together, playing off each other's strengths. "This must come about if both imaging technologies, screen and digital, are to get along together in a way that is profitable for both printer and customer. The marketplace will change of course, some wanting more of 'this' and less of 'that' but there will be no outright disappearance or significant changes to current methods or known/accepted technologies of today.

One thing is certain, without the next generation of screen printers poised to take their place, there will be no future. There must be schools & colleges helping to prepare that next generation.

Another important factor is the future will belong to those commercial printers who focus on process management through the use of software. "I think the biggest challenge in our industry is organization of production and data. Screen printing is a very production-oriented process with a lot of flow to it. There are not a lot of tools for printers or knowledge on how to systematize their businesses,".

Technology continues to propel the screen printing industry in new directions and being an active adaptor will certainly be a factor for those who hope for continued success, or at the very least, viability. I believe that practitioners and business owners need to begin thinking of screen printing itself as a technology.

As with many industries, screen printers will continue to compete with cheap labor overseas. Automation and communication will allow domestic operators to compete on price, but be cautious against chasing big orders by getting into bidding wars that often result in razor-thin margins, along with the very real possibility of getting undercut on subsequent jobs, no matter the quality of service provided.

"A customer that forces you to do that will drop you in the end because they don't respect you. The landscape is littered with companies, and not just screen printing ones, which play this game. Screen printing as a commodity should be dead,".

Remaining viable in the future may require diversification into different market segments. The opportunities exist, but aren't always recognizable to printers who lack vision or the proper training to move beyond their current market and operational parameters.

"Screen printing has always been a specialized process, a hybrid of printing, decoration, and manufacturing. If you are in one area, look into others.

"Interest in screen printing continues to be strong. So we service people trying to learn and grow.

In conclusion

The future of screen printing will need young skilled people, who go on to work in or start up screen printing shops of their own. They are the next generation. For getting this new generation on board and keep this Screen printing Alive, we must need some Technical Schools & colleges where screen printing education should be given to the students and develop their interest in this field. And also we will need the people who shared their insights for this story.

The veterans who have seen the industry change over the years, but more importantly, the visionaries who can see where it is headed and the innovators who can find themselves a productive place at the table. In that sense, the biggest challenge facing screen printing isn't digital technologies or market forces, it is complacency. As long as there are people who recognize screen printing's unique strengths and believe in its ability to satisfy customer's needs, there will be a future.

DEVELOPMENTS
IN SCREEN PRINTING IN THE CONTEXT
OF MODERN PRINTING OPERATIONS

Author: *Albrecht Gebhard,*
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Stork Prints, Boxmeer, May 2012.

Lead
Print quality is a topic in the area of screen printing nowadays more than ever before. The possibilities offered by screen printing have allowed the requirements of designers and consumers to increase.
This article therefore places special emphasis on engraving and printing techniques, as these are used as the essential basis for a good print.

Introduction
In the past few years, inkjet technology has become increasingly important for fashionable textile printing. Due to more capable printers and more cost-efficient processes, inkjet printing is currently experiencing a huge boom and developing into a production process.

This is having a positive effect on conventional rotary screen printing. The new design possibilities are having a positive effect on purchasing behaviour and have also led to a strong upturn in rotary screen printing.

Fig. 1 Conventional fashion printing, source: MD Gera

Interfering and overlaid abstract patterns have become fashionable thanks to inkjet printing. In conventional printing, such patterns have to be separated and rastered at great expense and then printed with a high degree of precision. Digitally printed patterns are also transferred and later engraved. This places high demands on the entire process.

Separation method
All of Europe's fashionable textile printers work with two methods nowadays, i.e. both digital and conventional. Consequently, the two technologies are not seen as being in competition, but rather as mutually complementing one another.

It is even common for prints that start life by being digitally printed in smaller quantities to then be engraved and printed conventionally for large follow-up orders for reasons of cost.
Almost all notable fashion printers in Europe now create patterns digitally and only proceed with engraving when orders are received.

This process produces a colour separation and pattern repeat during the creation of a digital print.
The separation traditionally takes place at a contract engraving company and the printer produces the different colour ways. It is clear that this method can lead to difficulties if the printer wishes to print the same pattern both digitally and conventionally. In order to align the print outputs of both methods to one another, it is important to simulate overlays and the dithering of the halftones that are given in the screen printing in the digital printing.
In addition, suitable colour space management is important, as the representable colour spaces in digital and conventional printing differ.
Stork Prints offers the possibility to satisfy these requirements with the modular best IMAGE software. This is a piece of CAD/CAM software which, in addition to separating and colourising, also controls engraving or can send calibrated files to a digital printer.

Engraving
The engraving technology is another important element for achieving good print quality in conventional printing. The traditional method of working with film and exposure to light has practically disappeared in Europe. Three technologies are used today. The jet technology sprays liquid wax or ink onto a coated screen. This serves as a mask during exposure and is washed out again during development. This technology can produce good results with halftone engravings, but edge sharpness, which is important for geometrical patterns and contours, suffers from various disadvantages. This above all affects ink systems, as these are applied cold and with low viscosity and therefore tend to bleed. Wax on the other hand is heated to approx. 110°C and cools suddenly when it comes into contact with the screen.

Amongst the digital engraving systems, laser engraving has been around the longest. Here, the lacquer is burnt off a coated and polymerised screen to form a pattern. Important param-

eters for the engraving process are the rotation speed of the screens, the power of the laser beam, as well as its focus and cycle frequency, which determine the horizontal and vertical resolution. Engraving can be done in the fast spiral mode or cylindrically for geometric patterns. An important prerequisite for flawless results is the roundness of the screens.
Another established option is laser exposing technology or LEX for short. This uses a laser beam to expose patterns on a coated screen. The extreme perfection of this option offers the best engraving results, as it works with a very weak laser beam, which exhibits the least diffusion. In terms of reproducibility, however, it is much more difficult to use than the laser engraving technology. This is due to the much higher number of process steps. After rounding and coating the screens, they are dried. After that, they are exposed under yellow light with a laser beam. Next, the screens are developed by washing the non-exposed part. Only then is the remaining paint polymerised. This process therefore contains very many parameters that can influence the outcome. Above all, the lacquer plays a big role, as it has to be specifically matched to the wavelength of the exposure beam for optimal results. The diodes that generate the laser beam also gradually lose intensity over time, which makes daily calibration necessary. In addition, the coating thickness, the intensity of the washing, the drying and polymerisation conditions and the downtime between coating and exposure are important. Stork Prints offers all of the products necessary for the process, from lacquers to coaters, polymerisation barriers and developers.

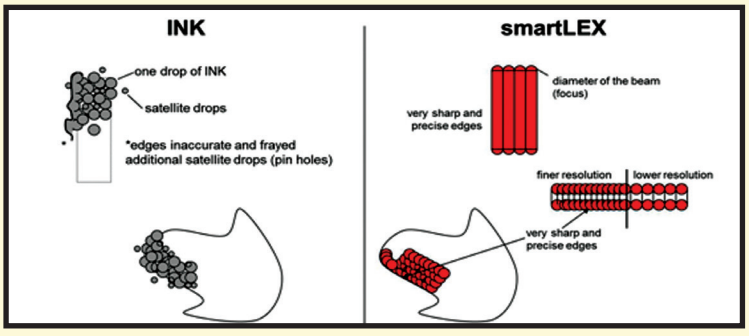

Fig. 2 Comparison of inkjet and laser engraving

In Western Europe, laser engraving is nevertheless the preferred method. It is reproducible as the lacquer is immediately polymerised after coating. More powerful laser beams are used, and the process is not so dependent on the thickness of the coating. This process also allows coated screens to be held in stock, so that re-engravings can be done at very short notice.
In order to increase productivity, modern laser engraving machines use powerful laser sources. For example, a 64 cm repeat screen measuring 1750 mm in width can be engraved with total coverage in about 20 minutes. The laser beam is no longer switched on automatically, but is controlled by a modulator at a frequency of 2 GHz. There is also the possibility of power modulation per engraved pixel. This allows sharp edges to be produced in the fine line printing process.
The laser source can be closed to avoid any permanent consumption of CO2. In conventional CO2 lasers, consumption is sharply reduced by catalytic converters.

Halftone printing

A lively and interesting print is noted for smooth and flowing procedures. In order to present halftones in conventional textile printing, the colour processes must be rastered. The halftone dot pattern should be fine and convey an overall halftone effect, even at close visual range. An important prerequisite for this is the fineness of the screen. In textile printing, the 195 NovaScreen with 16% open screen area has established itself for the finest of printing tasks. Finer screens are feasible (in the graphic area, Stork Prints delivers screens up to 405 mesh), but do not make much sense on a textile surface.

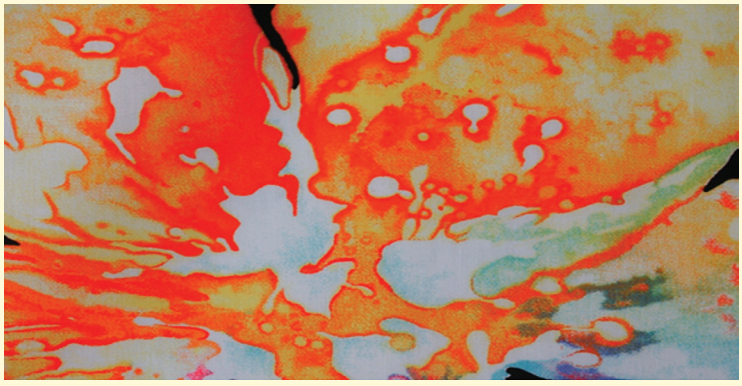

Fig. 3 Floral detail with Penta 125

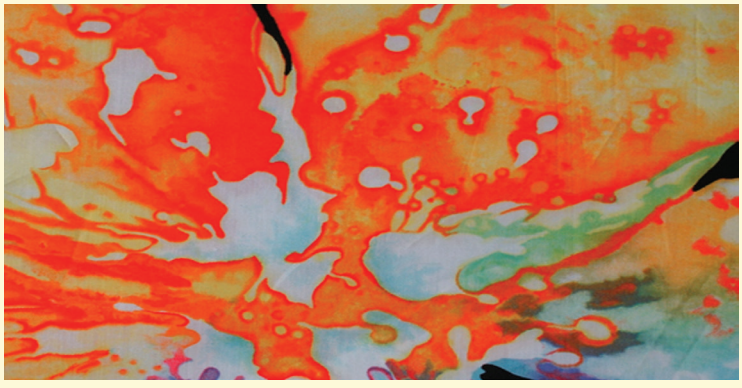

Fig. 4 Floral detail with Nova 195

In addition to the screen fineness, it is also important to match engraving and printing to one another.
This is done by determining the correlation between the size of an engraved and a printed halftone dot (it is usual to work with linear halftones in textile printing, whereby the impression of colour is defined by the size of the dots). The flow behaviour of the paste and the capillary force of the substrate make a printed dot appear much bigger that the engraved dot on the screen. The extent of the size difference also depends on the print settings and the type of screen. The result is that a raster separation is often set lighter in the CAD system during processing in order to obtain the desired result in the final print. The settings are then based on the sure instinct of the operator. Furthermore, engraving companies are often independent businesses that work on contract for print shops, therefore making it difficult to define the relationship between engraving and print.
The print process calibration therefore offers itself as a better and more reproducible way to achieve optimum halftone effects.

A print process calibration first involves printing a greyscale, in which the relationship between engraved dot size and colour intensity is linear.
The smallest engraved dot corresponds to colour intensity 0, i.e. the colour of the substrate; the biggest dot size is so big that the screen is completely open and a full tone is printed. Printing this greyscale with lightness steps of 0-100% almost always produces a closed colour area from 40-50% open engraving because the printed dots flow out so wide that they completely cover the substrate.
Using software developed by Stork Prints, each colour intensity can be assigned a raster dot size. This is done in a halftone curve. This calibration curve can then be used for all subsequent engravings that are printed in the same printing process. The result is that halftones can be printed long, flowingly and evenly graded. In addition, the halftone effects actually expected in the final print can be presented when working on CAD systems.

Halftone calibration is also important for another reason. If one wants, as mentioned at the beginning, to create digital patterns and then print conventionally, a halftone simulation based on this curve can already be used in the digital printing. The result is that it can be easier to adjust the digitally printed pattern in the conventional printing process.

Printing techniques

In the actual printing process, the screen plays a decisive role for the printed result as the carrier of the engraving and as a medium for the controlled delivery of the paste to the substrate. The requirements are high because, as described at the beginning, inkjet printing has set higher standards for print quality.

Screens are mostly described by the mesh number, the open screen area and the wall thickness. However, what is much more decisive for the printed outcome is the hole cross-section and diameter of a screen. That becomes clear when one considers that the paste from neighbouring screen holes should form a closed film for a homogenous covering of the substrate. If the webs between the holes are wide, a large hydrodynamic pressure must be built up in the screen, which causes paste to leak out; i.e. the paste is not exuded from the print form directly in the spandrel between squeegee or roller and screen, but slightly in advance so that it sticks to the outside and is pushed into the substrate as the screen continues to rotate and is squeezed to the side. The consequence of this is a high degree of penetration into the substrate and poor micro-equality, which is also described as orange peel. It was therefore always the goal to design the web so that the paste can flow out more easily and flow together with the paste of neighbouring screen openings.

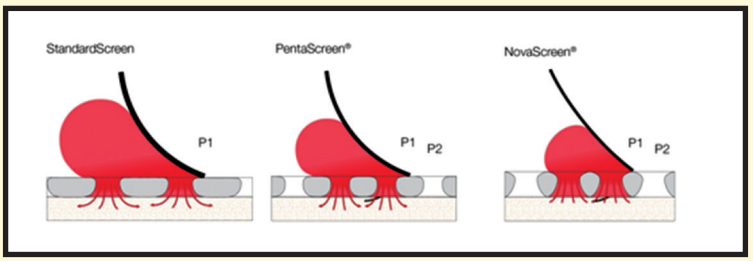

Fig. 5 Evolution of the screens

The development led to narrow and externally very strongly rounded web forms, which are characteristics of the Nova Screens and the innovative SP screens. Specifically, this means that work can be done with less squeegee pressure or with smaller rollers in order to achieve an even coverage of the substrate. That offers benefits for the printer in several regards. A more even surface pressure can be achieved, which in terms of colour impression is relatively more intensive than a print with penetration. That plays a big role above all with pigment printing, as less paste is used overall and thus fewer binders as well. Modern pigment recipes with good emulsifier systems allow 195 Nova Screens to be processed without problem nowadays. In trials with large batch jobs in Pakistan and Indonesia, a paste saving of 20-30% was substantiated at printers compared to Penta 125 screens for the same, colorimetrically measured colour intensity.

This saving can be traced not only to the web form, but also to the size of the hole openings in the various screen types. Poiseuille's law describes the theoretically expected volume that flows through a pipe of length l and radius r. If the equation is applied to screens, the results arrived at differ from the usual calculations of wall thickness x open screen area, as in this equation the radius is the most important parameter to the power of four. Accordingly, a Nova 195/16% (hole size 52 microns) delivers less at otherwise identical print parameters than a Penta 125/15% (hole size 79 microns) and thus underscores the savings potential for pigment printing.

$$Q = \frac{Pr^4}{8\eta l}$$

Q= Volume flow (paste quantity)
r= Hole diameter
P= Pressure difference between beginning and end of the pipe (=η/r)
η= Dynamic viscosity
l = Length of the pipe (screen thickness)
Fig. 6 Poiseuille equation1

In reactive printing, by contrast, the aim is often to achieve very strong or complete penetration into the substrate for fashionable qualities. Here as well, the Nova Screens have established themselves as an industry standard in Western Europe. Large backgrounds or printing methods that need complete penetration are printed with Nova 135, which has a 22% open screen area. Finer separations on voluminous Single Jersey qualities are primarily printed with Nova 165 Mesh, which has a good mix of fineness and permeability with 19% open screen area. In order to enable even greater fineness for the printer here, Stork Prints introduced a 195 Mesh Screen with 19% open screen area at the last ITMA in Barcelona.

In addition, there are new developments for screens intended for the use of effect pigments. These are noted for their very high open screen areas and thicker wall thicknesses.

Moiré

Moiré is a well-known phenomenon in textile printing. It describes the interference between the overlaying structures. If

a line halftone is used to present halftones, moiré can form between halftone and screen or between halftone and substrate structure. The effect occurs when the engraved halftone dots fall precisely on the screen holes with regular repetition and are slightly displaced in the gaps in between. This effect occurs above all in the light halftone area, where the engraved halftone dots are smaller. It then produces a light/dark effect that appears in the form of waves or lines.

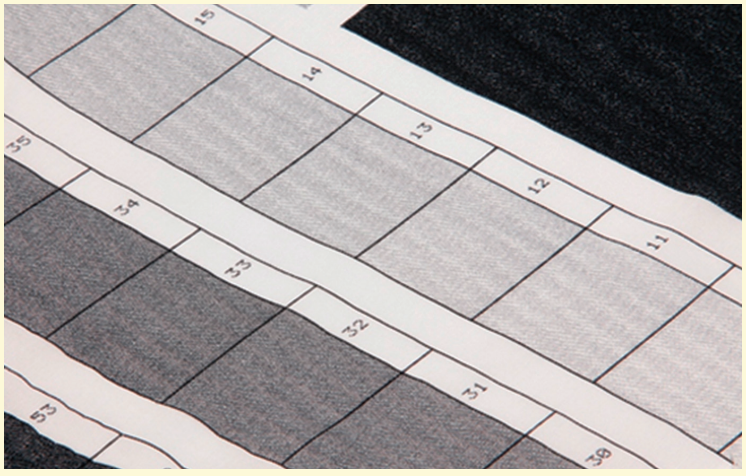

Fig. 7 Moiré

Open substrates such as CV-Georgette or substrates with a subtly marked weft structure such as CV-Javanaise can produce the same effect.
This also occurs with very fine full tone patterns, when, for example, a web or wooden structure is printed as a separation. This frequently produces rosettes, in which a dot is surrounded by a regular circle of dots.
In response to this problem, Stork Prints introduced a screen in which the arrangement of the screen holes is slightly disorderly. The holes are no longer in dead straight lines, but slightly offset. This new Random® screen can suppress the problems mentioned above.

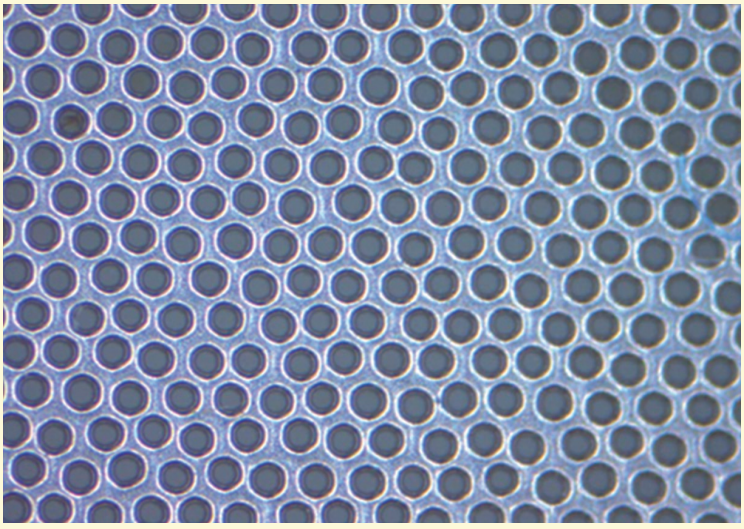

Fig. 8 Random Screen RM125

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