



The History of Screen Printing

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Where would we be without screen printing? Perhaps this is not the kind of question that is asked very often but it's worth posing right now. Why? Basically because screen printing can be simple or complex; can require very little outlay or may need expensive sophisticated equipment; thousands of items can be produced or just a one off. No matter which scenario applies, the process must be useful since we have been using it continuously for more than a hundred years but its origins stretch back to the mists of time.



In recent years screen printing processes have really accelerated and as a consequence are evident in so many goods we buy from promotional pens, to electronic components and transparent shirts complete with almost photographic designs. As technology progresses at an awe inspiring pace the future of screen process printing holds much promise. It will allow us to wear components, which in the past were bulky items, such as battery chargers; we will be able to power our cars with solar cells printed on the roof of the vehicles and there will be all kinds of exciting science fiction style developments that have evolved from printed circuit boards which were such a revolution when they were first produced.¹

What is Screen printing?

So how might you define screen printing if you were trying to explain it in basic terms? In its simplest form an ink blocking stencil is placed against a woven mesh frame and ink or any printable material is transferred through the mesh onto paper, fabric or whatever material you choose to print on. This design transfer is achieved by moving a blade or squeegee over the stencil which will push the ink or paint through the holes in the mesh. It's something many of us were taught in school but in the hands of a master, extraordinary effects will be achieved.



In short, think of it this way: a base is used, then material such as textile or paper is laid on top, the template is above that, followed by a screen; ink is added and a blade is pulled across the screen spreading the colour over the template to leave a design.²

Early attempts at screen printing

Screen printing always looks new and exciting and appears to have endless capacities to reinvent itself but in fact the concept, as we know it, goes back at least a thousand years. It was actually the Chinese who perfected the art using a form of screen printing as long ago as 1000CE, so you cannot say this is a new invention by any stretch of the imagination.

However, the Chinese were not first off the block as evidence of a form of screen printing, using leaves and charcoal, has been discovered on walls dating back to Neolithic times and also in Spanish and French caves which have been preserved for thousands of years. It turns up again in the Pacific where it was sometimes used with Batik techniques and can be seen as the precursor to the colourful Hawaiian shirt. Even as far back as Medieval times screen printing allowed for a form of mass production, primarily used for making playing cards; and later in the 1600s the first wallpapers were made where shapes were finely coated in wool dust to look like a form of embroidery, which is not so different to industrial screen printing processes used today.³

The Chinese and also the Japanese developed a more refined process where silk was held firmly between two pieces of waterproofed paper that had shapes and designs cut into them. This was possibly the first time the process began to resemble what we understand as screen printing today.

The Asian continent seemed to take this printing method to their hearts, many years before others joined them, and made significant progress alongside their other passion for printing techniques using blocks.

Europe discovers screen printing



Perhaps, surprisingly or not, depending on your viewpoint, Europe lagged behind in this area and didn't 'get the power' of screen printing until the 18th century. French patterns were found to have been stencilled onto shoes and fabrics during this period. Maybe it was the introduction of silk mesh that really changed things for the Europeans.

Throughout the 19th century screen printing was still quite primitive, with printers stretching fabrics such as organdie over frames made from wood to secure the position of the stencils and islands whilst the stencilling and printing process took place. Things changed quite dramatically in the 20th century when the process

was mechanised, usually for printing flat posters or packaging and fabrics. It became widely used to print coloured wallpaper as a cheaper alternative to printing with wooden blocks.

It seems strange to contemporary commentators that no one actually patented silk screen printing in the UK until one Samuel Simon did just that in Manchester during 1907; this possibly explains why people were led to believe this process is a new art form belonging to the 20th century.

One also might suggest there is nothing very surprising at all since historically the silk screen industry was very secretive about new developments which were occurring at that time and did not want to share techniques; it was hardly an inclusive industry. These days transparency is evident in both process and product except for cutting edge designs which are set to change lives.

Screen printing in the Twentieth century

Of course, nothing remains the same and in the second decade of the 20th century screen printing technology, that was making slow progress, was shaken up by a trio of printers who decided it was worth looking at how photo reactive chemicals might perform in this medium.

Beck, Peter and Owens tried every which way to introduce chromic acid salt emulsions into screen printing, resulting in designs that were light sensitised thus creating photo reactive stencils. This was just the beginning of an exciting journey and between them these new types of stencil would revolutionise the way images were transformed onto all kinds of surfaces, although to be fair, screen printers took some time to adopt them. However, once it took off, screen process printing was used on all kinds of Point of Sale (POS) materials, signage, vehicle graphics and a plethora of promotional products including promotional pens, pencils and business gifts in general.

Screen printing in the US



John Pilsworth, an American, worked with different stencils on different screens and this enabled multi-colour to be used resulting in the famous Uncle Sam image which is still familiar now.

In the 1930s and 40s, whilst Europe was immersed in the Second World War, the US pumped money into art with the simple aim of providing work for artists. However, this initiative had a far greater reach than this, and as a consequence of this

drive, art was brought to the masses. Teaching screen printing suddenly gathered momentum, workshops and colleges sprung up to share this knowledge and screen printing gained massive popularity.

Screen printing, education and politics

Teaching students how to make prints was one way of involving the general public in making a modern looking form of art. As a consequence of screen printing being much easier than a complex process such as lithographs, it soon became the technique of choice. Interestingly it was even mooted that screen printing represented a more democratic approach to making artwork and therefore it was perhaps not surprising that the political Left should embrace this form of print communication. In fact many significant protests and uprisings were almost underwritten by home-made screen printed posters which became a call to arms. After all, visual and educational materials which were to be used as a form of propaganda had never been more relevant than in the 1940s.

This banner was taken up by political activists all over the world and iconic posters were designed for the civil rights movement, the strikes of 1968 in France and other centres of dissent. Somehow it seemed appropriate to make dramatic use of screen prints to spread political messages, whether it was San Francisco, Berlin, Russia, Portugal, Spain or Mexico City. Social change posters continued to spring up throughout the 1970s and even spawned some community based workshops such as the famous La Raza in San Francisco.⁴

In the twenty first century commercial interests have largely swallowed up the need for manual screen printing and many things have become extremely sophisticated as technology continues to develop. Not least the industry's desire to adopt a less toxic and slightly greener approach to bi-chromates, for example;



stencils are now the norm. One other transposition is the change from silk mesh to polyester which is the preferred material but there are others including nylon and stainless steel combinations which obviously give more strength. This now means screen process printing is used in a

wide variety of contexts from lottery tickets with rub removable silver to wallpaper, glass decoration and beyond. In fact expect to see screen process printing on everyday items such as:

Printed circuits

Plastic bottles and containers

Textiles, T Shirts, clothing and thermal transfers.

Industrial Nameplates & Labels

Wallpaper

Glass decoration

Promotional umbrellas, printed bags, promotional pens, printed USBs and almost any business gift imaginable.

The mechanisation of screen printing and commercial impact of Warhol

In fact, if one considers the impact Warhol's screen prints had on the art world, marketing and popular culture we cannot possibly underestimate what has been achieved using this very simple technique. Warhol's screen prints of Monroe and Campbell's soup, as just two examples, have been reproduced endlessly and by 1960 there were even machines developed which could print hundreds of items quickly and cheaply and also transfer prints to circuit boards. Mass produced screen printed items were just beginning to emerge and fifty years later are everywhere.

The first rotary machine capable of printing in many colours was designed by Michael Vasilantone who had a background in both art and enterprise. His patent was soon licensed to the industry as a whole, transforming screen printing processes and speeds forever. Even today screen printing garments take up more than 50% of all US output in this field and the demand for screen printing on Textiles, T Shirts, clothing and thermal transfers is growing exponentially. Where there is a surface, e.g. on an umbrella or a backpack or even stationery bags, screen printing techniques can be applied.⁵



Different types of screen printing

What is the basic process therefore that has spawned such a massive industry? In broad terms three kinds of screen printing presses are used: Flat bed, Cylinder and Rotary. Some items, especially textiles make use of a wet on wet process where the colours are then actually dried on a screen then printed further using yet another screen ensuring the design is aligned accurately. There are many things to consider when using such techniques, including something called 'dehazing' which is where ink appears thus producing a ghost image. This happens when ink gets trapped in the mesh of the screen, often where threads cross one with another and processes have needed to be improved to take into account the pinpoint accuracy required on printed circuit boards for example.

There are preparations before anything is even printed and this is called the pre-press process, where emulsion is pulled across the surface of a screen and the 'exposure unit' then manages to burn out superfluous emulsion. This means a clean section in the mesh will coincide identically with the image required for the final print. This is followed by taping with pallet tape which stops ink leakage onto the next layer. The screen and the frame are then lined with tape and this is followed by blocking out any of the pin holes which are unnecessary within the emulsion layer.

Contemporary developments in screen printing

These days you will see mass produced screen prints which achieve the right mix of colour and design to make dynamic statements on virtually any potential surface. Screen printing is regularly used on promotional pens, T-shirts, baseball hats, glass, paper, polyethylene, metals and wood and anything else that can hold a design. Full colour CMYK printing is common and results are almost guaranteed and it is flexible enough to cope with many type of surface or medium. In fact it has been called 'the most versatile of all printing processes.'¹



It seems incredible how screen printing has become synonymous with both subculture and radicalism but has also been embraced by mainstream advertising. With the ease of computer design one can only imagine a new form of DIY screen printing will probably be hailed as the new shabby chic. As soon as any product achieves techno perfection the wheel turns and consumers hunger for a product that looks hand made. Certainly this style is much in evidence in movie merchandise, album artwork and old fashioned promotional flyers which do not appear to lose their original appeal.

Basic techniques of modern screen printing

So, what are the basic techniques behind this ever evolving process?

1) One tried and tested method is to use a macro photo. This is where a stencil has been made photographically and so any gaps that aren't covered by the stencil will receive the ink.

2) Photo emulsion technique is where the silk screen frame is coated in emulsion. This is dried and then the transparency is placed backwards on the emulsion surface. Plate glass is placed over the screen and is in contact with every part of

the transparency. It is then left in normal light for about twenty minutes. Removing the emulsion will then reveal the design.

3) Solar cell and electronic printing is another powerful and potentially transformational use of screen printing techniques which can be used on the thinnest of materials. Silicone based optical fibres, that are composed of solar cells, can be woven together with silicon wires to create extremely flexible solar fabrics which may well be exploited further by the use of screen printing techniques in the future.

The other great thing about screen printing as a contemporary technique is the difference in materials available for use that will create a completely different



finished product with only a slight change in material.

Thus this process is a real advantage when printing

for industrial labels and signage, vehicle graphics or

for the promotional printing market where promotional

pens, caps, t-shirts and Jute bags can all be tackled

with ease. With so many different processes to

choose from promotional gifts can be transformed just by the type of ink, bead or

flocking used.

4) Caviar beads can make a stunning surface that adds interest; it is easily achieved by covering the original surface with glue and then dropping in beads; a fashion that is currently very popular.

5) Cracking In produces an attractive crackle glaze effect once it has dried.

6) Discharge inks are clever as they actually permit a printer to put light on dark as the inks lift the earlier dye and the whole effect is much less harsh. The downside is the colour is difficult to manage and therefore the whole effect is rather more impressionistic or distressed in tone.

7) Expanding inks are fun as they puff up the ink so it appears to rise from a material and even looks like it has slightly three dimensional qualities.

8) Flocking allows designs to have flock or foil types of material to be added and this will give the desired reflective or mirror type finish or even a softer feel as if the design is made of velvet.



The CMYK process makes use of four colours which help to make the full range of colours required for photographic printing. This is a real bonus as it necessitates only four screens and the finished result is more vibrant and also more economi-

cal regarding production costs. Therefore it has become the process of choice for all kinds of promotional products from soap dispensers, tags, key chains as well as industrial scale signs.

There are various glosses, glitter-like substances, mirrored silver and Nylobond additives. The latter allow for waterproof and more technical fabrics to be utilised for printing purposes. For example, dye-based waterproof inks, can now perform well against UV, dry rapidly and allow for simultaneous multiple film print.

One of the most interesting developments has been the use of an ink called Plastisol and this is now implemented almost exclusively throughout the commercial garment industry. The fashion for pictures on more formal clothing rather than just t-shirts has been promoted through this plasticised ink which contributes to a much softer effect on lighter fabrics. If something dramatic is required, additional ink layers can increase intensity to the desired effect. The only additional cost is the need for curation at a heat of around 150 degrees centigrade.

What is clear is that screen printing has developed exponentially in recent years with other processes such as 'Suede' which is actually an additive combined with Plastisol to give a feel akin to suede. This is achieved in a similar way to puff ink but is less effusive and simply raises the ink to look and feel like a suede imitation.

Of course there are also water based inks which are often used when a less harsh feel is required, especially in fabrics which need to drape or cling, and they are also used when large print areas need to be covered.⁶

Cutting edge developments using screen printing

However, one of the most exciting developments in contemporary screen printing has been the ability to print on extraordinarily slim solar photovoltaic cells. This



means the idea of printing solar cells on the top of vehicles for example is now becoming a reality. The real challenge is to ensure a low breakage rate and this can be carefully controlled through the screen printing process as the thickness of any paint or ink can be controlled specifically. This may mean battery recharging will become a thing of the

past as we may all be sporting wearable power sources composed of printed solar cells which can operate at any time and add considerable convenience to the wearer.

These challenges will continue to confront the screen printing industry as technology develops and demand becomes more complex over time. For example, some

companies are replacing the different layers of non-printed materials in LCD television screens with just one printed layer and expensive wiring can be replaced by printed wiring in some vehicles. Replacing silicon chips with electronic tickets is of the ideas to make products more democratic as price points lower.

Nevertheless, in the promotional products industry there are “horses for courses” and there will always be the necessity for promotional pens, baseball caps and t-shirts with or without their own battery chargers.⁷

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