**SET 10**

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# GUIDE TÉCNICA DEL EXPERTO

## IMPRESIÓN TEXTIL

**GUÍA 2:** IMPRESIÓN DIGITAL O SERIGRAFÍA

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## PROCESOS DE SERIGRAFÍA E IMPRESIÓN DIGITAL

Traditional processes are being disrupted everywhere and in every industry, from communications to education. However the graphics industry has been especially keen to embrace new working methods based on digital data processing, especially in prepress and content creation. The convenience and reduced costs involved have driven uptake of digital output technologies worldwide. Digital printing has gradually spread to new areas of application, as quality improves and longer run lengths become more viable. This is true for all forms of print and most recently for textile printing.

That is not to say that traditional textile printing methods will be replaced any time soon. Screen printing, both flatbed and rotary screen, will dominate textile production for many years to come because these are industrial processes configured to produce huge volumes of materials. And yet digital printing is rapidly disrupting conventional supply chains and creating new opportunities.

Kornit Vulcan digital textile press

The leading provider of digital textile printing systems is Kornit. The company describes the Vulcan as a "digital rival to screen printing carousels".

## ECONOMIC EXPECTATIONS

There are many dimensions to this unprecedented disruption and it is easy to be distracted by the temptation of the new. Novel approaches to production are exciting and business owners often want to be at the cutting edge of new technology applications. However enthusiasm for digital production of textiles should be kept in a commercial context. A production model is only realistic, if it can deliver the desired results within an economically viable framework.

Preparation, printing and finishing are necessary for all forms of textile production and common to both traditional and digital methods. However the complexities of each step differ for the different methods. The advent of direct digital printing has reduced complexities and driven process collapse in textile printing, as with all print applications.

## SCREEN PRINTING PROCESS

Established industrial methods for traditional fabric production are iterations of screen technology, which involves complex and specialised prepress production. This means it is costly and slow so it is uneconomic for short runs. The high down time, high wastage of fabric and paste, high engraving costs and high labour costs in what is an extremely specialised manufacturing process are not justified for short run work produced on demand. However screen printed textiles have some advantages, such as the fact that the ink is deeply absorbed and long lasting. The process produces a superior image quality with sharper image edges due to precision engraving, and it is well suited to high volume production.

Industrial textile printing processes share some common features with other forms of print in that they start with a

design that must be reproduced. For textile printing, the design is separated into its individual component colours. Each separation is the basis of unique stencils, one for each colour in the design that is to printed. Screen printing is not a CMYK process that uses four subtractive colour separations to produce many thousands of different hues. In screen textile printing colours are printed one at a time, layer on layer, to produce a thick ink layer, and vibrant colours. It is extremely difficult to accurately produce halftone images using screen technology because each step in a tonal gradation requires its own screen.

The stencils are mounted on individual screens or cylinders and fixed in place before being transferred to an exposure unit. The separations may also be created directly using a laser engraver. The stencils overlay a mesh or screen and screens are selected according to the suitability of the mesh for different applications. Different sizes of mesh can produce different looks on the fabric.

Once exposed, the screen is transferred to a washout unit where the unexposed emulsion is washed away and the screen dried and checked before being mounted on press. This could be as a frame for flatbed printing or as a sleeve on a cylinder as is the case with rotary screen printing. The width of rotary cylinders is limited due to the weight of these rollers. Flat bed screen presses can be very wide, but they are slower than rotary screen presses so most textile production is done on rotary screen presses.

Print is created when each ink is squeezed through the holes in the screen's mesh, one screen and stencil for each colour for areas that are not blocked by the stencil. Individual inks are forced through the mesh to the substrate using a blade that moves across the screen for flatbed presses. Inks are continuously fed into the screen through an inking unit on rotary presses. Multiple screens are required to print a multicoloured image and how the ink gets squeezed through the screen depends on the size and type of press, so it could be by hand for t-shirts or in an automated process for industrial scale screen printing. Once printing is complete the screens and/or cylinders must be removed, washed and stored for reuse.

Multicolour screen printing presses, both rotary and flatbed need to be very long in order to print all the colours in a design so they take up a lot of space. All screens must be precisely aligned to avoid registration problems or colours bleeding into each other, Registration accuracy is also important to ensure that the correct outline of a design is precisely printed, so process control is extremely important for printing textiles with analogue technology.

However process control in screen printing can rely on two important graphics standards. ISO 2834-3 (Graphic technology -- Laboratory preparation of test prints -- Part 3: Screen printing inks), outlines a test method for producing test prints with screen printing inks. The standard provides a useful means of checking a print's optical qualities including colour, transparency and density, as well as gloss, lightfastness and resistance to mechanical or chemical impacts.

ISO 12647-5 specifies the requirements for the screen printing of four-colour process-colour material used for display, signage, and graphics using flat bed or cylinder printing equipment. However there is no part in the ISO 12647 series for textile printing nor is there a part for digital printing. In both cases the diversity of technologies and practises does not lend itself to standardisation.

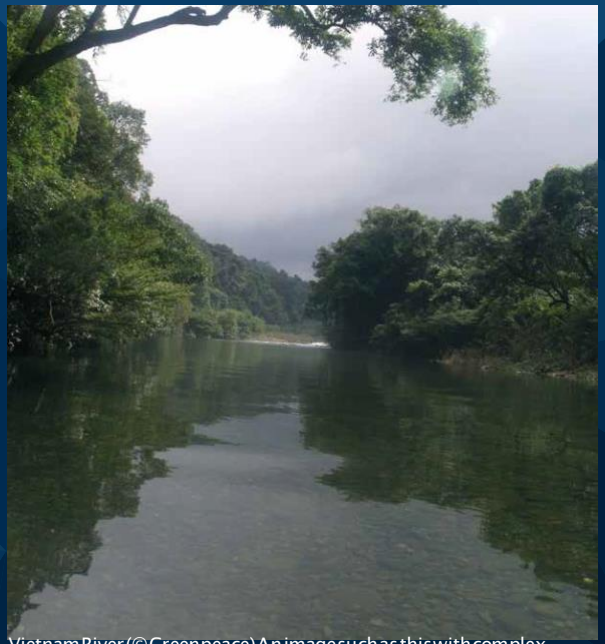
Screen printing is a mass production method suitable for long runs but not for microruns and this is the fundamental difference between digital and analogue processes.

## THINK DIFFERENT

There are many iterations of digital and screen production processes and the business contexts these technologies support. Working with digital data gives the business and manufacturing processes all the benefits of direct output and control through data management rather than analogue process management. In a digital system content data is delivered direct to the fabric, on demand and can include complex photographic images and variable data. With no need for mechanical separations and processing, digital printing is much cheaper for short runs and so well suited to e-commerce environments.

Support for photographic images offers designers new options, especially for fashion and vanity textile printing. There is no ink spread with digital printing but colours do not last as long. This is of marginal concern for applications where a high turnover is likely, such as for fast fashion. Digital printing supports runs of one, making it ideal for on demand and e-commerce applications.

The collapse in processing steps is the primary reason for the excitement surrounding digital printing. It is a new technology that makes possible the exploitation of digital data, design software and e-commerce. Digital printing cannot yet compete with conventional processes in traditional applications, however advances in digital printing make it increasingly viable as a replacement technology. The huge diversity in technologies is driving new applications and allowing printers to capture new markets for small runs and on demand applications. Such applications cannot be economically served with industrial printing systems, and this is perhaps the most significant difference between conventional and digital printing of textiles.



Vietnam River (© Greenpeace) An image such as this with complex shades is very hard to reproduce using analogue printing technology. But it is possible to print onto fabrics using digital technology without compromising the design.

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