

Screen-printing

Screenprinting, silkscreening, or serigraphy is a printmaking technique that creates a sharp-edged image using a stencil. A screenprint or serigraph is an image created using this technique.

It began as an industrial technology, and was then adopted by American graphic art well before the 1900s. It is currently popular both in fine arts and in commercial printing, where it is commonly used to print images on T-shirts, hats, CDs, DVDs, ceramics, glass, polyethylene, polypropylene, paper, metals, and wood. The Printer's National Environmental Assistance Center says "Screenprinting is arguably the most versatile of all printing processes." [1] Since rudimentary screenprinting materials are so affordable and readily available, it has been used frequently in underground settings and subcultures, and the non-professional look of such DIY culture screenprints have become a significant cultural aesthetic seen on movie posters, record album covers, flyers, shirts, commercial fonts in advertising, and elsewhere.

History of printing (Technologies)	
Woodblock printing	AD 200
Movable type	1040
Intaglio	1430s
Printing press	1439
Lithography	1796
Offset press	by 1800s
Chromolithography	1837
Rotary press	1843
Flexography	1890s
Screen-printing	1907
Dye-sublimation	1957
Photocopier	1960s
Pad printing	1960s
Laser printer	1969
Dot matrix printer	1970
Thermal printer	
Inkjet printer	1976
Digital press	1993
3D printing	

Graphic screenprinting is widely used today to create many mass or large batch produced graphics, such as posters or display stands. Full color prints can be created by printing in CMYK (cyan, magenta, yellow and black). Screenprinting is often preferred over other processes such as dye sublimation or inkjet printing because of its low cost and ability to print on many types of media. Contents [hide]



Screen printing example

Printing technique

A screen is made of a piece of porous, finely woven fabric (originally silk, but typically made of polyester since the 1940s) stretched over a frame of aluminum or wood. Areas of the screen are blocked off with a non-permeable material to form a stencil, which is a negative of the image to be printed; that is, the open spaces are where the ink will appear.

The screen is placed atop a substrate such as papyrus or fabric. Ink is placed on top of the screen, and a fill bar (also known as a floodbar) is used to fill the mesh openings with ink. The operator begins with the fill bar at the rear of the screen and behind a reservoir of ink. The operator lifts the screen to prevent contact with the substrate and then using a slight amount of downward force pulls the fill bar to the front of the screen. This effectively fills the mesh openings with ink and moves the ink reservoir to the front of the screen. The operator then uses a squeegee (rubber blade) to move the mesh down to the substrate and pushes the squeegee to the rear of the screen. The ink that is in the mesh opening is transferred by capillary action to the substrate in a controlled and prescribed amount, i.e. the wet ink deposit is equal to the thickness of the stencil. As the squeegee moves toward the rear of the screen

the tension of the mesh pulls the mesh up away from the substrate leaving the ink upon the substrate surface.

There are three types of screenprinting presses. The 'flat-bed' (probably the most widely used), 'cylinder', and 'rotary'.

Textile items are printed in multi-color designs using a wet on wet technique, while graphic items are allowed to dry between colors that are then printed with another screen and often in a different color.

The screen can be re-used after cleaning. However if the design is no longer needed, then the screen can be "reclaimed", that is cleared of all emulsion and used again. The reclaiming process involves removing the ink from the screen then spraying on stencil remover to remove all emulsion. Stencil removers come in the form of liquids, gels, or powders. The powdered types have to be mixed with water before use, and so can be considered to belong to the liquid category. After applying the stencil remover the emulsion must be washed out using a pressure washer.

Most screens are ready for recoating at this stage, but sometimes screens will have to undergo a further step in the reclaiming process called dehazing. This additional step removes haze or "ghost images" left behind in the screen once the emulsion has been removed. Ghost images tend to faintly outline the open areas of previous stencils, hence the name. They are the result of ink residue trapped in the mesh, often in the knuckles of the mesh, those points where threads overlap. [2]

While the public thinks of garments in conjunction with screenprinting, the technique is used on tens of thousands of items, decals, clock and watch faces, and many more products. The technique has even been adapted for more advanced uses, such as laying down conductors and resistors in multi-layer circuits using thin ceramic layers as the substrate.

Stenciling techniques

A macro photo of a screenprint with a photographically produced stencil. The ink will be printed where the stencil does not cover the substrate.

There are several ways to create a stencil for screenprinting. An early method was to create it by hand in the desired shape, either by cutting the design from a non-porous material and attaching it to the bottom of the screen, or by painting a negative image directly on the screen with a filler material which became impermeable when it dried. For a more painterly technique, the artist would choose to paint the image with drawing fluid, wait for the image to dry, and then coat the entire screen with screen filler. After the filler had dried, water was used to spray out the screen, and only the areas that were painted by the drawing fluid would wash away, leaving a stencil around it. This process enabled the artist to incorporate their hand into the process, to stay true to their drawing.

A method that has increased in popularity over the past 70 years and is tremendously popular is the photo emulsion technique:

The original image is created on a transparent overlay such as acetate or tracing paper. The image may be drawn or painted directly on the overlay, photocopied, or printed with a laser printer, as long as the areas to be inked are opaque. A black-and-white negative may also be used (projected on to the screen). However, unlike traditional platemaking, these screens are normally exposed by using film positives.

The overlay is placed over the emulsion-coated screen, and then exposed with an ultraviolet light source in the 350-420 Nanometer spectrum. Other light sources do not work well. The UV light passes through the clear areas and create a polymerization (hardening) of the emulsion.

The screen is washed off thoroughly. The areas of emulsion that were not exposed to light dissolve and wash away, leaving a negative stencil of the image on the mesh.

Photographic screens can reproduce images with a high level of detail, and can be reused for tens of thousands of copies[citation needed]. The ease of producing transparent overlays from any black-and-white image makes this the most convenient method for artists who are not familiar with other printmaking techniques. Artists can obtain screens, frames, emulsion, and lights separately; there are also preassembled kits, which are especially popular for printing small items such as greeting cards.

Another advantage of screenprinting is that large quantities can be produced rapidly with new automatic presses (up to 1200 shirts in 1 hour).[citation needed] (The record is over 2000 shirts an hour.)

Screenprint methods

Plastisol

the most common plastisol based print used in garment decoration. Good color opacity onto dark garments and clear graphic detail with, as the name suggests, a more plasticized texture. This print can be made softer with special additives or heavier by adding extra layers of ink.

Water-Based inks

these penetrate the fabric more than the plastisol inks and create a much softer feel. Ideal for printing darker inks onto lighter colored garments. Also useful for larger area prints where texture is important.

PVC/ Phalate Free

relatively new breed of ink and printing with the benefits of plastisol but without the two main toxic components - soft feeling print.

Discharge inks

used to print lighter colours onto dark background fabrics, they work by removing the dye in the garment – this means they leave a much softer texture. They are less graphic in nature than plastisol inks, and exact colours are difficult to control, but especially good for distressed and vintage prints.

Foil

consists of a glue printed onto the fabric and then foil is applied for a mirror finish.

Glitter/Shimmer

silver flakes are suspended in a plastisol ink to create this sparkle effect. Usually available in gold or silver but can be mixed to make most colours.

Metallic

similar to glitter, but smaller particles suspended in the ink. A glue is printed onto the fabric then a nanoscale fibers applied on it.

Expanding ink (puff)

to plastisol inks which raises the print off the garment, creating a 3D feel.

Caviar beads

again a glue is printed in the shape of the design, to which small plastic beads are then applied – works well with solid block areas creating an interesting tactile surface.

Four color process

artwork is created using dots (CMYK) which combine to create the full spectrum of colours needed for photographic prints – this means a large number of colors can be printed using only 4 screens, making the set-up costs viable. The inks are required to blend and are more translucent, meaning a compromise with vibrancy of color.

Gloss

a clear base laid over plastisol inks to create a shiny finish.

Nylobond

a special ink additive for printing onto technical or waterproof fabrics.

Mirrored silver

Another solvent based ink but you can almost see your face in it.

Suede Ink

Suede is another great ink that is easy to print and gives the image a textured leather, simulated suede look and feel. Suede is a milky colored additive (much like a plastisol base) that will work in a regular plastisol. It is actually a puff blowing agent that does not bubble as much as regular puff ink. With suede additive you can make any color of plastisol have a suede feel. The directions vary from manufacturer to manufacturer, but generally you can add up to 50% suede additive to your normal plastisol.

Print Gocco

Print Gocco is a Japanese commercially-produced home screenprinting system. Masters are created with the use of flashbulbs to burn an image into the screen. Over one-third of Japanese households own a Print Gocco system.

Versatility

Screenprinting is more versatile than traditional printing techniques. The surface does not have to be printed under pressure, unlike etching or lithography, and it does not have to be planar. Screenprinting inks can be used to work with a variety of materials, such as textiles, ceramics, wood, paper, glass, metal, and plastic. As a result, screenprinting is used in many different industries, from clothing to product labels to circuit board printing.