

Introduction to Printed Textiles

In its simplest form textile printing is the process of applying colour to fabrics to form pattern. One colour gives a one colour print; two or more colours will give a multi-colour print.

Printing usually involves a number of processes and steps:

Preparing print pastes. Dye or concentrated pigment colour are made into a print paste using both pigments and binders OR dye, water, thickeners and other chemicals to aid fixation.

Printing the fabric. This can be done using a range of techniques, which includes block, engraved roller, flat-bed screen, rotary screen or digital, depending on the image, type of fabric and the length of the print run.

Block printing uses blocks of wood with the design for each colour cut in relief. This method is not used very much in commercial European production, due to its labour intensive production costs.

Engraved roller printing uses copper rollers, with the design and colour separation engraved on each. Very fine details, vertical stripes and half tones can be readily achieved, using this fast and continuous process, but set up is very expensive.

Rotary screen printing uses continuous, seamless circular metal mesh screens, to create continuous pattern. It is one of the more common methods of European production.

Transfer printing uses paper to sublimation transfer disperse dye inks onto synthetic fibres using heat as the fixation. The transferred print lies on the surface of the cloth and fine, photographic details and shaded effects are possible.

Digital printing uses drop on demand digital technology to print dye stuffs on to pre-coated cloth, in much the same way as a domestic paper printer.

Drying the printed fabric. All fabrics must be thoroughly dried before they can be fixed to the cloth, through heating or steaming.

Fixing the printed fabric. Fabrics are fixed and processed using either heat (heat press or baker) or steam, which is sometimes referred to as “ageing”.

After treatment of the printed fabric. The fabric will be rinsed to remove paste thickeners and any surplus unfixed dye and chemicals. Often a gentle detergent wash is applied, followed by a further rinse before drying.

Printing Equipment

Print Tables

The print tables are for the printing of your fabric and their surfaces must be kept in immaculate condition to ensure clean, crisp and consistent prints. Before you can begin printing, you are responsible for adhering your own grey (backing cloth):

1. Apply a thin, even layer of table gum (solvitose) using one of the dirty table squeegees in the print room. While the adhesive is drying, wash and dry the table squeegee returning it to the print room.
2. Collect a grey (backing cloth) from the dye lab, the size suitable to the workspace required.
3. Fix your grey using a hot iron, working from the centre of the cloth outwards to avoid creases. If the gum is reluctant to stick, you can revive it with a gentle spray of water, using the yellow water spray bottle in the print room.
4. Masking tape or pin your fabric for printing to the grey. Working from the centres out, smooth your fabric to ensure a flat surface on which to print – you need to tension out as many creases and ripples as possible, to ensure a smooth print surface (just like you would when stretching paper).
5. When your printing session is complete, you will need to remove the grey and put it straight in the washing machine or laundry drum.
6. The table is scrubbed down with clean water and a scrubbing brush. Excess water can be squeegeed off, directly into the drip trays at either end of tables A and B and into one end on table C.

Screens and mesh counts

Screens are one of the most important pieces of equipment in our print room – look after your screen and it will look after you! The screens available to you are mostly steel or aluminium framed with a 49 count twill weave mesh.

When setting up your own print studio, it is important to consider a range of mesh counts and finishes dependent on the processes you would like to use:

MESH COUNT	PARTICLES (PRINTED GLITTER)	ADHESIVES	OPAQUES & PASTES	PIGMENT	DYES
15T	Excellent	OK	OK	Not recommended	Not recommended
34T	Not recommended	Excellent	Excellent	Good	OK on heavy fabrics
43T	Not recommended	Good	Good	Excellent	Good on heavy fabrics
55T	Not recommended	Not recommended	OK	Good	Excellent
62T	Not recommended	Not recommended	Not recommended	OK	Excellent on fine fabrics

Positives

When creating artwork suitable for screen, we refer to it as a “positive”. The positive needs to be pure black and white, with all black areas of the design becoming the final screen print.

Your positive should ideally be smaller than the screen mesh size to allow space for printing ink to collect in order to produce a good clean print.

Screen coating

We coat screens using Azocor Z1 photo emulsion that is activated by UV light. The emulsion is relatively expensive, so it is important that you only coat your screen on the day that you want to expose it.

Before coating your screen it is important to check that your positive is perfect black and white, printed on 90gms paper and there is space in the exposure room drying cabinet for your screen to dry. Screen emulsion is kept in the fridge, to maximise its shelf life, until you are ready to coat and expose your screen.

To coat and expose your screen, you must first be shown how to do so by a Lecturer or Technical Demonstrator, and should always wear gloves:

1. Select a coating trough best suited to your screen size, ensuring that the edges of the trough remain within the mesh area, securing and a left and right side end onto the trough.
2. Pour the screen emulsion evenly into the trough, allowing enough emulsion to comfortably coat your screen.

3. Place your clean, dry screen against the wall, using the wall stops to stabilise your screen where possible.
4. Place the edge of the trough against the screen mesh, gently tilting until the emulsion touches.
5. Smoothly and carefully pull the trough of emulsion from the bottom of the screen to the top (upwards) until you are approx. 1" away from the edge of the frame, where you can wiggle the emulsion over the last inch to avoid waste (it's a neat trick!)
6. Removing one end of the trough, replace all screen emulsion to the pot.
7. Place screen in the drying cabinet, ensuring that all wet screens sit below those drying above.
8. Replace the emulsion to the fridge and thoroughly wash the screen coating trough and ends.

Screen Exposure

Your positive should be placed on the exposure unit image side facing up, with your screen placed mesh-side down onto the image. The rubber lid of the exposure unit is pulled down and the lid clamped shut. The vacuum is switched on to form a tight seal around the screen, holding it into place during the exposure.

The exposure unit measures the length of exposure in light units, not seconds. A 90gsm thin paper with pure black and white photocopy/ computer printouts will expose well at 40 light units.

After exposure the vacuum is switched off, to release the screen, and the soft emulsion (where the black of your positive was) washed out using the spray head in the washout booth.

FAULTS	CAUSE	SOLUTIONS
The image washes away completely after exposure.	The image is underexposed.	Carefully check the exposure time, ensuring the image is on 90gsm thin paper.
	The image has not been exposed as a result of the lamp overheating.	Check that the lamp has started by looking for a leakage of light between the lid and the body of the exposure unit.
	The coating is too thick.	Check immediately after coating by holding the screen up to the light. The screen should be a uniform olive green colour. Take any excess

		off with a coating trough if necessary.
The image does not wash away/ leaves only a shadow after exposure.	The screen has been dried with excessive heat or been left in the drier too long. The maximum storage time (48hrs) of the coated screen has been exceeded. The emulsion is old and unviable. The image is over exposed.	Remove screen from the dryer as soon as the screen coating is dry. Do not coat screens that you don't intend to use immediately. Unlikely to happen. Check the exposure time, ensuring that your positive is on 90gsm thin paper.
An apparently well exposed and open stencil does not print or only prints in part.	Inadequate washing has allowed scum to form in the open stencil areas.	Ensure that the screen is thoroughly washed during exposure. Wash screen again thoroughly after printing to open up the stencil.
Only part of the image washes out.	Thin areas in the positive.	Check positives to ensure opacity across the image. Paint or recolour in black if necessary.
Pinholes in the screen.	Dirty positive or dirty glass on the exposure cabinet.	Clean up positives as much as possible. Clean glass before and after use.

		Paint out pinholes with a little screen emulsion and allow to harden and dry.
Watermarks in the stencil before or after exposure is made.	Washed screens in the emulsion dryer. Unexposed screen left in an area where it is likely to get wet.	Do not allow washed screens to be placed in the darkroom dryer. Keep unexposed screens away from water splashes.
Screen does not work after printing and drying.	Pigments and/ or adhesives have been allowed to dry into the screen. Pigments or adhesives have been cleaned with hot water.	Wash screens immediately after use. Do not clean pigments or adhesives with hot water.

Reclaiming screens

We use a dip tank to reclaim screens (strip and remove imagery and screen emulsion) using easiway easistrip supra dip tank solution.

To reclaim your screen:

1. Wearing gloves place your screen in the dip tank for approx. 5mins. The chemicals in the dip tank degrade over time, so if your screen emulsion is taking in excess of 10 – 15mins to soften please do inform the Technical Demonstrator who will clean and replace the tank chemicals.
2. Remove your screen from the dip tank, draining any excess chemicals into the dip tank, and place into the wash out bay with mesh side facing you.
3. Wearing face protection and ear defenders blast out any excess old emulsion using the pressure washer.
4. When your screen is clean, and clear of old emulsion, replace the pressure washer gun to its station, turn off the power and water supply.
5. Wipe down the screen frame and mesh, using the towels provided in the washroom, and place in the drying rack, ensuring that your screen is placed into the rack mesh-side up.

Screen printing and squeegees

High quality screen printing relies on best practice – a well gummed grey to print upon, a high quality positive onto a screen that is evenly coated, well exposed and thoroughly washed.

To screen print:

1. Masking tape or pin your fabric for printing to the grey. Working from the centres out, smooth your fabric to ensure a flat surface on which to print – you need to tension out as many creases and ripples as possible, to ensure a smooth print surface (just like you would when stretching paper).
2. Place your screen mesh-side down onto the fabric.
3. Place print paste onto the screen at the end opposite to you, in the gutter space that has been left to the top of your positive.
4. Using a clean, dry squeegee, pull the print paste towards you using a firm even pressure. The number of pulls you make is dependent upon the fabric and print paste that you are using.
5. When you squeegee hold a stance where your legs are slightly apart to give you better balance.
6. Your arms should be almost straight and your hands at either end of the squeegee handle, fingers straight and spread to maximise control.
7. If the screen is longer than your natural reach, work with a partner to push and pull the squeegee from top to bottom of the screen.

Squeegees are expensive to have re-bladed so it is important to take good care of them in the workshop. Do not leave dirty squeegees on the table surface and thoroughly clean and dry your squeegee in between prints.

Do not leave squeegees in the wash booth, sinks or anywhere in the workshop – return them to the squeegee racks when you have finished printing.

Screen washing and drying

After use your screens must be washed thoroughly on both sides to ensure all print pastes and adhesives are removed in the wash booth. You should only need clean, cold water to clean your screen and should wear eye protection and gloves when cleaning.

If you do not wash your screen it can block and you will need to strip, recoat and expose your positive. Not only is this time consuming but it is also wasteful and expensive, so be sure to wash your screens thoroughly between use.

Screens are dried in the drying cabinet and should take 5 – 10 mins to dry thoroughly. Screens are placed mesh-side facing up and away from the steel arms of the drying rack to avoid tears and holes. If you do accidentally damage the mesh of your screen, please let a Lecturer or Technical Demonstrator know immediately.

Do not leave your screens in the drying cabinet if you have finished printing instead return it to its numbered space under the print tables.