

# Screen Printing & Colour

a complete guide



# Screen Printing and Colour

## Introduction:

As a way of transferring designs onto fabric, screen printing originated in China (around AD 221).

The Japanese soon followed this and began using simple stencilling techniques to create imagery. Stencils were cut out of paper at this time and human hair was woven to create the mesh. They used stiff brushes to force ink through the mesh onto the fabric.

In the 17th century, silk screens were used in France as a way of printing onto fabric and stiff brushes were still used as a way to push ink through the mesh. This was where the practice of stretching silk over a frame to support stencils originated.

In the early part of the 20th century, squeegees were introduced as a more convenient way of pulling ink through the screen mesh.

In 1938, a New York group of artists began experimenting with screen printing as an artistic medium onto paper, and later coined the term 'serigraphy.'

Pop Artists in the 1960s such as Peter Blake, Andy Warhol and Robert Rauschenberg used screen printing as an integral element to their practice and popularised it as a medium for creating contemporary art.

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## You will need:

- |   |                                    |    |                      |
|---|------------------------------------|----|----------------------|
| 1 | Screen Printing Frame (Pre-Meshed) | 9  | Plastic Sheet        |
| 2 | Exposure Unit                      | 10 | Stencil Card         |
| 3 | Stencil Emulsion                   | 11 | Screen Printing Inks |
| 5 | Coating Trough                     | 12 | Squeegees            |
| 6 | De-Coating Agent                   | 13 | Permanent Markers    |
| 7 | Paper or Fabric of Choice          | 14 | Apron                |
| 8 | Cold Water Dyes (Optional)         |    |                      |

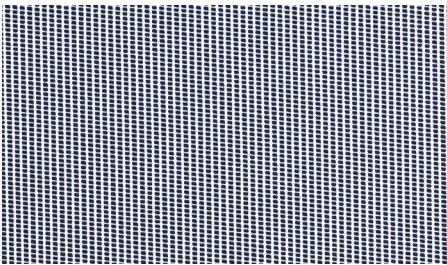


# Screen printing frames and meshes

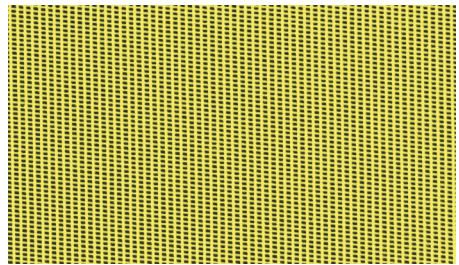
Screen mesh is an integral part of the screen printing process. The type of mesh you use depends on the results you want, the type of stencil and material which is to be printed on.

Different mesh sizes are used for different applications in the screen printing process. You just need to remember the following:

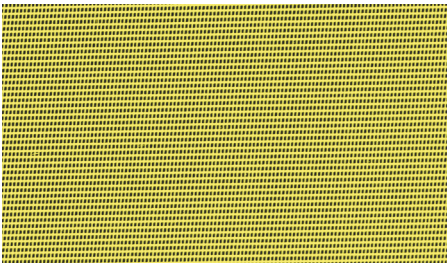
- Mesh size is measured by how many threads of mesh there are crossing per square cm (TPC) or per square inch (TPI). For example, a 120 mesh screen has 120 threads crossing per square cm.
- The higher the mesh count, the finer the threads and holes are in the screen.
- The size of the mesh has a lot to do with how detailed your image is and how thick the ink you are using is. If you have an image with extremely high detail, a lower mesh screen won't hold the detail. The fine lines or dots in the image will simply fall through the holes in the mesh not giving you a correct representation of your image.



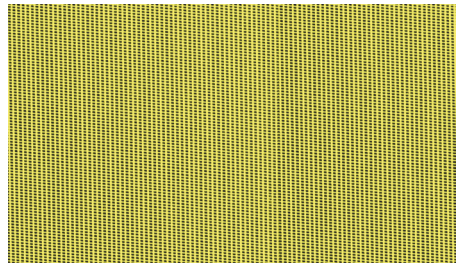
43 TPC White



43 TPC Yellow



90 TPC Yellow

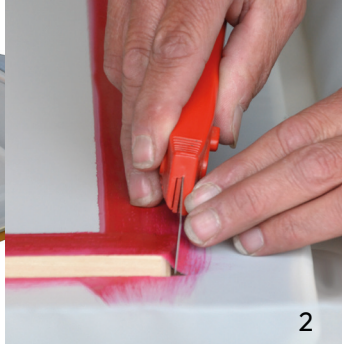


120 TPC Yellow

Above are the Professional Aluminium Frame meshes available from Dryad Education. Standard Wooden Pre-Meshed framed are also available for A4 and A3 printing.

If it comes to the time when you need to re-mesh your screen, you can follow either of the 2 methods below:

### Rack Screen Stretcher



1. Lay your screen on a level surface, and place the rack stretcher over the top of it. Fasten each side of the mesh into the rack stretcher and use the turning screws to adjust the tension on the mesh until it is drum tight.

2. Lay a board or piece of card the same size as the inner area of your frame on top of the mesh. Using a stiff, short bristled brush, paint mesh adhesive onto the frame by applying onto the areas where the mesh is in contact with the frame. Hold the board/card on top of the mesh in place whilst painting the adhesive on to protect the screen printing area of the mesh, then remove it whilst the adhesive is still wet. Leave the adhesive to dry thoroughly.

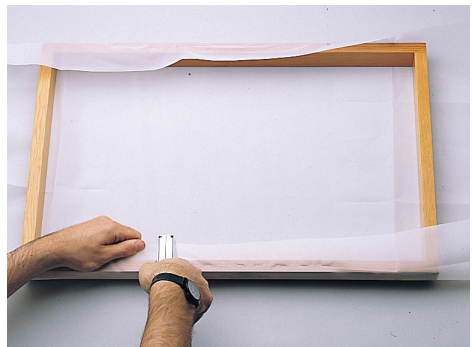
3. Using a sharp knife or scalpel, cut the mesh away from the outside of the frame then release the mesh edges from the rack screen stretcher. The screen is ready to mask.

### Reverse Tacking

1. Cut a piece of mesh approx. 20cm larger than your frame. Lay the mesh on a flat surface and place the frame on top. Fold the mesh over one side of the frame and place the staple in the centre of the frame, through the mesh, with a staple gun. Stretch the mesh out to each side and staple in place along the frame until the mesh is pulled tight and securely fixed to the frame.

2. Pull the mesh tightly on the opposite side, and staple the centre point. Pull the corners out diagonally up and away from the centre of the frame, then tack in position. Repeat for each end of the screen until the resulting mesh is held drum tight.

3. Trim any excess fabric away from the back of the screen.



# Stencil emulsion

There are a wide range of stencil emulsions available which offer clean edge prints without bleeding and deterioration issues which some paper and card stencils can create. Exposure unit emulsions offer an easy way of making professional stencils for screen printing. But there are also light bulb exposure emulsions if you do not have the expense of an exposure unit.

## Sensitising

Before coating your screen, ensure it has been cleaned, degreased and thoroughly dried.

Prepare your emulsion in darkened conditions: fill the small sensitizer bottle half full with tepid water, replace the lid and shake, leave for 1 hour. Empty the contents of the sensitizer bottle into the larger tub of screen emulsion and stir well until the colour is uniform. Allow standing time for any air bubbles to disperse before use.

Pour some emulsion into a coating trough and, holding the trough handle in one hand and the screen in a vertical position in the other, draw the emulsion up the screen to coat. Use a squeegee to remove excess emulsion from both sides of the screen until the coating is completely even.



Place the frame mesh side up, making sure the mesh is not touching anything, in a dark, light-proof place where warm air can circulate for 24 hours or until thoroughly dry.

## Preparing Your Positive

Prepare your design positive on acetate or clear film. The aim of the positive is to block light from getting to certain parts of the photo-sensitised screen. The solid areas of your design will become your print. You can draw a design by hand using a black permanent marker or brush on Indian ink. You may need to retrace your design on the reverse of your acetate sheet to create a denser design. Laser and inkjet acetate sheets are also available to print a design directly onto.



## Preparing Your Screen Ready for Exposure

Place your screen mesh side down onto a piece of black, non-reflective card, and position your positive on top of it. Cover the positive with a piece of glass to hold it in place. The first step is to expose your final stencil. This is vital in order to achieve a strong positive and also, so that you do not over-expose, resulting in the emulsion curing to a hard, plastic finish which may be difficult to remove.

Exposure times can vary considerably, depending on the type, wattage and age of your light source. With a

Portable Photostencil Exposure

Unit, begin your test strip at

around 15 minutes. For

larger units, times

start from 10 seconds.

The emulsion that has

cured to a rubbery

finish with clean, crisp

lines has received the

correct exposure time.



## Developing

Once you have established the correct exposure time for your stencil, expose a new, coated screen for this length of time. Once the screen is exposed, it must be washed out immediately. Wet the screen well on both sides. Loosen the soft, unexposed emulsion by rinsing the areas with cold water.

If the screen is properly exposed, the unexposed areas will be a different colour to the exposed emulsion, and will wash away revealing the clean mesh beneath. Once dry, it is ready to screen print with. Store the screen in a dark place when not in use. The exposed screen will still be sensitive to light, so in light conditions it will continue to react and the coat of emulsion will harden over time. If this occurs, the screen will need to be re-meshed or jet washed to remove the emulsion and reclaim the screen.



# Reclaiming your screen

## Reclaiming Your Screen Using De-Coating Agent

If the stencil emulsion has cured to a rubbery finish, then De-Coating Agent can be applied to reclaim the screen. Brush the agent on to the screen making sure that the entire stencil is covered. Lay the screen into a tray containing De-Coating agent and allow to soak with the mesh fully submerged for 15 minutes. This process is important because, once the agent is applied, it will begin to thin the emulsion by reacting with, and dissolving, the surface layer.

If the stencil is left exposed to the air at this stage of the process, the emulsion will begin to dry and solidify. Once this happens the stencil is difficult to remove and may need jet washing.

With the screen still submerged in the de-coating agent, brush vigorously with a Screen Cleaning Brush until the emulsion is frothing off the screen. Do not use any water until this is evident.



Next, wash under the tap while continuing to brush. Eventually the emulsion will begin to 'peel' off like thin rubber. Keep scrubbing until the mesh is clear.

You can also use solvent-based removers such as Stencil Strip Powder which is again diluted with water to create your solution. This can sometimes work better than using a water-based agent against water-based emulsions.



### Reclaiming Your Screen Using A Pressure Washer

When the stencil emulsion has cured to a hard, plastic finish, then a Pressure Washer must be used to reclaim the screen. Position the screen upright in a spray booth or other suitable location where the water jet will not damage the surroundings and can drain away. Wedge it in to a corner for added support, as the power of the pressure washer can move it around.

The water jet needs to pass through the screen from the opposite side to the stencil. The high-pressure water passes through the mesh and shatters the hard stencil, cleaning it away. The washer nozzle will need to be guided up and down the screen to remove the entire stencil from inside the mesh holes and may need more than one pass. By holding the screen up to the light you will be able to determine if you have any blocked holes remaining. There may be a 'shadow' of the stencil left on the surface of the mesh and this can sometimes make it difficult to see whether the entire stencil has gone. To test this, carry out a screen print onto white paper. The print should be solid colour if it has all been removed.



# Stencil screen printing



Stencil card is manufactured using refined paper furnish that is tub sized and wax coated, making it water-resistant and stronger than paper. This means that a single stencil can produce many prints. This 375micron manilla card can even run through printers and photocopiers. By placing the stencil card under the mesh prevents the squeegee from catching on the cut edges.

1. Choose a bold graphic design, which will hold its rigid form when cut. You can either print out a design or draw your own. Your design should be formed with simple straight lines and curves to allow for easier cutting.
2. Next measure the dimensions of your screen mesh and cut a piece of stencil card to the appropriate size for your mesh. Your card should cover some of the masking tape surrounding the frame, but ensure that your design does not protrude onto the masked area.
3. Transfer your design over to stencil card. Use tracing paper to copy your design in pencil, and then rub on the reverse to transfer the pencil marks to the card. Make sure that the design doesn't run too near to the outer edges of your card.
4. Using a sharp scalpel or craft knife, carefully cut out your design. The areas that are cut out will allow ink to pass through the mesh onto your chosen substrate.
5. Lay the cut-out stencil on the mesh on the reverse of the screen and smooth all the edges down until they are flush to the mesh. To keep the stencil in position, stick the outer edges down using brown polypropylene tape. The screen is now ready for printing.

6. Position the screen with the stencil side down onto your substrate. Lay a strip of ink at one end of the screen. Pull a squeegee across the surface of the mesh to push the ink through using a smooth, gliding motion. The stencil can be used for multiple prints. Once you have finished screen printing, remove the tape and stencil. Clean the mesh with screen wash to remove any ink.

Greaseproof Paper can also be used with this method, instead of stencil card.

# Fabric and dyes

## Fabrics and Preparation

Many fabrics are difficult to identify, particularly synthetics and mixtures such as Terylene/Wool, Polyester/Cotton. If fibres are not named, check for any washing instructions or labels as this may be a guide.

Fibres that are difficult to Home Dye or Print are most commonly: Acrylics (Courtele, Dralon, Orlon, Neospun), pleated Tricel, anything with a special finish (drip dry cotton, flameproof nighties and pyjamas, mothproof and waterproof garments), cashmere, glassfibre fabric, mohair, felt, plastic sponges, anything which has a bonded interlining, foam or plastic backing. Suede and leather have special paint on dyes of their own.

It is essential that all fabrics are washed before dyeing to remove all dressings, impurities, dirt or stains.



## Fabrics and Preparation

Cold water dyes can be used to make up your own colours, diluted with water, But to make them suitable for screen printing, you will need to use a thickener or printing medium, such as Manutex. This is a chemical, so always take care when using.

There are a wide range of ready-made inks for screen printing, and for use on textiles. These are water-based inks which are iron-fixed, and can be easily cleaned with water, when still wet. Textile inks can be used on a variety of fabrics such as cotton, polyester, blends, linen and felts, and can also be used on board and paper.

These inks tend to be transparent, however, if you would like a more opaque finish and tone down the colour intensity, add Opaque White to your mix. The inks can also be thinned with up to 5% water to prevent screen clogging when using higher mesh count screens.

If you're looking for a top quality printing ink that provides you with unlimited colour selection, whilst being versatile in application, then Printex is the ink to use, Suitable for both screen printing and fabric painting. Printex is mixed with 1 part colour, to 20 parts binder, as the colours are concentrated pigments in liquid form. For Opaque White, mix 3-6 parts colour to 20 parts binder.



## Paper and Board Inks

Specialist Crafts water-based inks will work best on paper and board and perform brilliantly when combined with stencils. They are easy to clean up and won't block your mesh. Unfortunately these inks will not fix on to fabric.

The inks can be diluted with up to 50% water, and to make these more opaque, add Opaque White to tone down colour and increase opacity.

Acrylic paints can be mixed with screen printing medium to produce a good quality screen printing ink.



# Trouble shooting

**Your design does not wash clear from the screen after exposing:**

The screen may have been **OVEREXPOSED**. Wash the screen out with stecil strip or de-coating agent and conduct a test strip. If necessary, reduce the amount of time each strip is exposed for (try 2 minutes per strip, reducing to 20 seconds per strip if required). The design may also have not have been opaque enough, allowing light to reach the areas of the screen where your design should have been. Re-colour your design, colour on the reverse of the acetate or print multiple copies on a printer and layer the sheets together.

**When washing your design out, some of the detailed areas will not wash out:**

The screen may have been **OVEREXPOSED**. Very detailed designs require a much more accurate judgment of the exposure time required. Once you have completed a test strip and worked out that the correct exposure is, for example, between 12 and 16 minutes, it may be necessary to carry out another test strip starting at 12 minutes and working along every 10 or 20 seconds up to 16 minutes to find the precise exposure time which works with your design.

Detailed areas are susceptible to **LIGHT SEEPAGE** where, during long exposures, light creeps under the edges of the design due to the thickness of the acetate raising the design marginally above the surface of the emulsion. Draw your design on both sides of the acetate and ensure the acetate sheet is held flat to the surface of the screen with a glass or acrylic sheet to help to prevent this problem.

### The emulsion will not wash out of the screen using the stencil strip or de-coating agent:

The screen may have been OVEREXPOSED, either through incorrect exposure timing or due to being stored in a non-light safe environment. The screen can be cleaned using a pressure washer as detailed on page 9.

The screen may have been partially cleaned with stencil strip or de-coating agent and then left to dry before the emulsion was fully removed. Once the emulsion has dried at this stage, it can only be cleaned using a pressure washer.

### Storing the emulsion after mixing:

After mixing, the emulsion should be stored in a cool, dark place. The shelf life after mixing is 4 weeks. We advise you write the mixing date on the label to ensure the product is used within this time. The manufacturer does not state that storing the product in a refrigerator will increase the shelf life, so we are unable to guarantee that this method will be effective.

### You have washed your screen but the design is still visible:

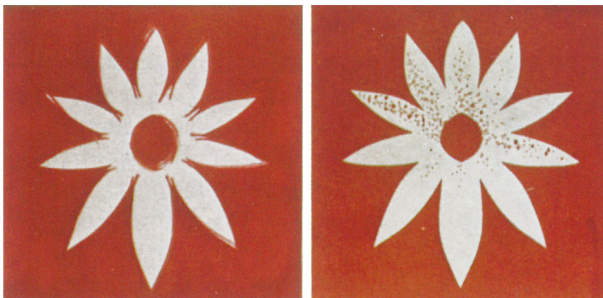
It is normal to see some shadowing of a design on your screens where the ink has discoloured the mesh. Hold the screen up to a light source to check whether the mesh is clear. If there is some emulsion or ink blocking the holes in the mesh, clean these areas with a pressure washer as detailed on page 9.

### A smudged print:

This can be caused by either movement of the screen during printing, or a slack screen covering. Ensure you are working on a clear, flat surface and sufficient pressure is applied when using a squeegee down the screen.

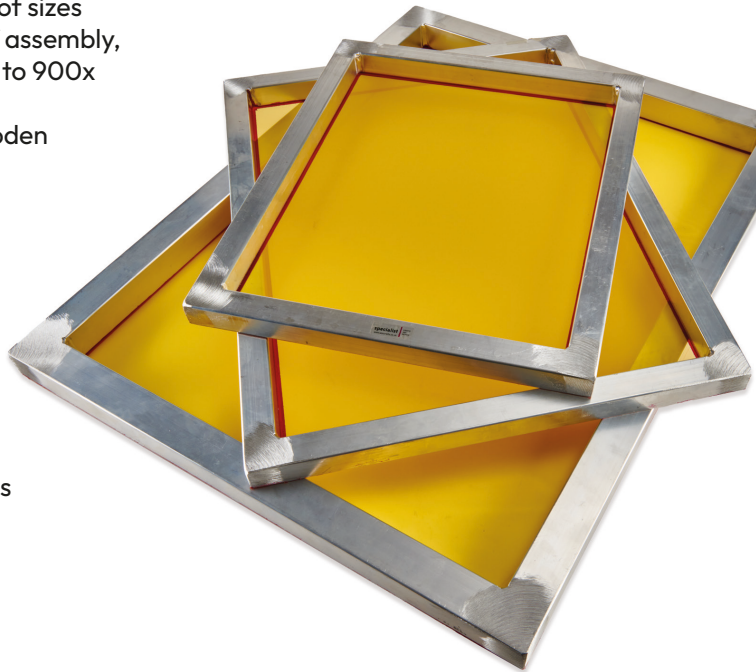
### Spots of colour around pattern area where ink should've have printed:

Pin holes have developed in the masking or during the emulsion stage. Ensure that your positive is blacked out enough, and your emulsion has been exposed for the correct amount of time.



# Screen printing supplies

- Screen Printing Packs: Contains everything you need to get started for both beginners and primary
- Screen Printing Watercolour Inks: For paper and boards, available in 300ml bottles and 1 litre tubs and assorted colour sets
- Colourtex Textile Inks: Available in 250ml tubs
- Water-Based Textile Inks: Available in 1kg tubs and assorted colour sets of 6 and 10
- Printex Fabric Colours: 100ml bottles
- Printex Binder: Available in 1kg and 4.5kg tubs
- Acryl Screen Printing Medium: 2 litre jerry can
- Stencil Card: 375 micron weight in sheets of two sizes
- Permanent Fineliners: In a pack of 12 and 48
- Plastic Sheets: Available in polyester and PVC, in sheets or a variety of pack sizes
- Exposure Unit Emulsions: A variety of emulsions complete with sensitiser bottles
- De-Coating Agent: In a 1 litre bottle
- Stencil Strip Powder: 100g tub which makes 5 litres
- Coating troughs: In a range of sizes
- Portable Exposure Unit: Self assembly, accomodates for frames up to 900x 635mm
- Standard and Premium Wooden Frames: In a range of sizes pre-meshed
- Squeegees: In a range of sizes to fit frames
- Premium Aluminium Frames: In a range of sizes pre-meshed
- Tracing Paper: Available in a roll or sketchpads
- Screen Cleaning Brush
- Cold Water Dyes: In 50g tubs
- Manutex: In a 500g tub
- Aprons: In a pack of 100



For more information on our range of screen printing supplies including beginners packs, pre-meshed frames and inks, contact us via:

Call: **+44(0)116 269 7711**

Online: **[www.dryadeducation.com](http://www.dryadeducation.com)**



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