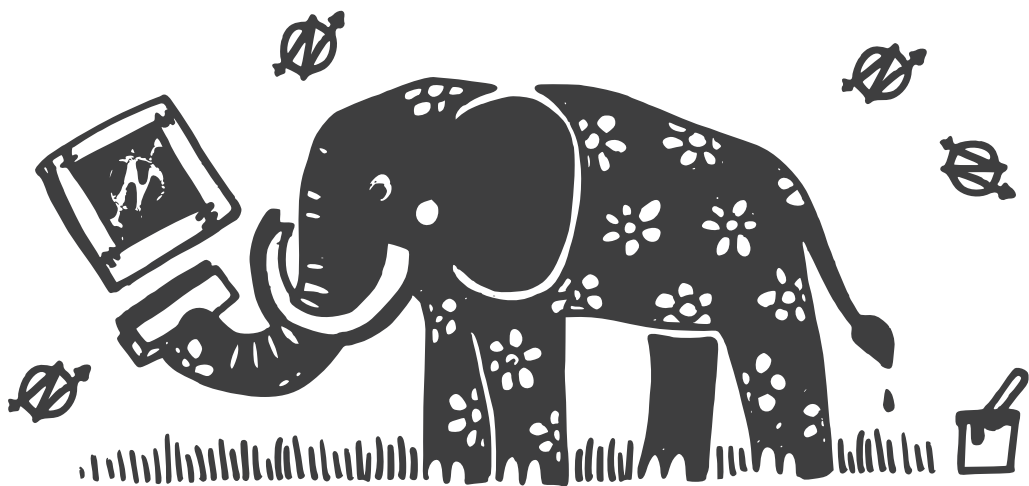


SUPER-LOW-TECH SCREEN PRINTING A DIY GUIDE



Screen printing is a relatively easy way to reproduce designs multiple times onto t-shirts and patches, etc. The conventional method usually involves printing digital images onto transparencies which are transferred onto a 'silk screen' covered in a photo sensitive chemical in a light unit. However, there are older low-tech approaches which allow you to produce prints without all the expensive kit and making use of mostly found or recycled materials. This zine will teach you all you need to know to get started.

About this zine

This is the print version of an online guide by the same name. It was produced entirely using open-source software (Scribus and Inkscape).

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Online version

The online version is public wiki page on crabgrass where you can leave comments and download the PDF to print and the Scribus file used to layout the zine. Find it at <https://we.riseup.net/diy/screen-printing>

Weblinks

Since webpages move or vanish we've avoided putting links in the zine. Visit the online version for links to suppliers of pre-made screens, embroidery hoops, squeegees and paint etc. as well as links to other guides to making screens or screen-printing generally.

Translations

You may find French, Spanish or German translations of this via the online version. If you would like to offer or help with translations then please get in touch.

Credits

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Introduction

We first started messing about with low-tech screen-printing at the climate camps in Bonn and La Harve. At the No Border camp in Brussels later the same year we found ourselves doing a workshop. The technique was attractive because it enabled us to produce t-shirts and patches etc. for campaigns/action without needing any equipment or spending much money.

We knocked-up frames using everything from pallet-wood planks and cut timber, to plywood batons and chipboard. For mesh we utilised fabric from a womens blouse, a scarf and sheer curtains. We variously stapled, gaffer-taped, nailed and glued both frames and mesh as well as experimenting with different ways of creating the artwork. Over time we've learned from mistakes and honed our methods.

Although nothing we've been doing is new, most people these days wouldn't think to use these methods so we thought it would be good to promote this cheap and accessible approach by producing a guide.

Pros & Cons of this technique

- + More spontaneous and accessible
- + More DIY, authentic and creative
- + More recycled and sustainable
- + Requires less equipment/chemicals
- + Very cheap apart from the paint
- Less reliable and predictable
- Less flexible in terms of artwork
- Labour intensive putting artwork on screen
- Can't just print off digital imagery
- Can't reuse screens

Why Use The Low-tech Approach:

You need something printed today.

You just want a dozen or so t-shirts, armbands, or patches.

You prefer not to spend much money on this.

You don't have a studio and want to do this where-ever and when-ever you like and need.

You don't have access to all the kit required for photo exposure.

You don't expect this to become your job or a primary hobby.

When To Opt For Photo Exposure:

You already have access to equipment/chemicals.

You want intricate artwork or lots of small words.

You want to use digital imagery.

You need separations for multicolour design.

You want hundreds of t-shirts / might sell them.

Some readers might find the following conversions handy

Currency: £1 ~ €1.2 ~ \$1.5 (at time of writing)

Measurements: 1 inch / 1" = 2.5cm / 25mm

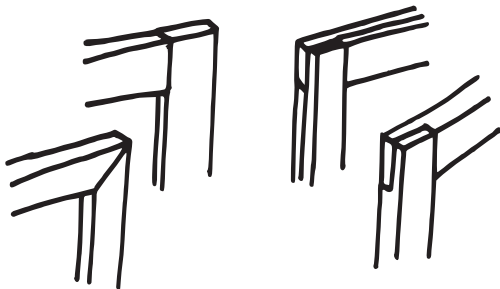
Essential Equipment

The Screen

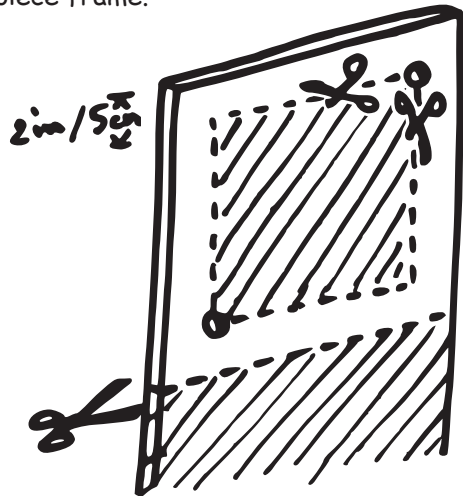
Ready-made screens can cost as little as £15 (for a small one ~10" square). If you planned to use photo emulsion you'd be able to reuse the screen for different artwork by applying another chemical to remove the dried emulsion. This is not practical when using the low-tech approach but fortunately it is easy to make your own screens with minimal materials and tools.

Making a frame

You will need four pieces of suitable sized wood to form the frame (depending on your needs, about 15" is good size). The best joins require accurately cutting notches or 45° angles. Don't worry though, it's fine just butting the pieces together at 90°. If your wood is fairly thin then you could use eight pieces to create two identical frames, then fix one on top of the other with the butted corner joins offset. Use nails, screws, staples or glue to fix it together.



There is an even easier way to make a frame but it requires a drill and jig saw. Take a piece of 3/4inch plywood, chip or particle board (easily found in skips). Cut it down to be about 4 inches larger in each dimension than the screen size you desire. Drill holes about 2 inches from two of the corners diagonally opposite each other (the hole needs to be larger than your jigsaw blade). Now cut in two directions from each hole, parallel with the edges and maintaining about 2 inch clearance. When done, the bit in the centre should fall out leaving you with a one piece frame.



You could take a short cut by using an old wooden picture frame with the glass and back removed. You might also like to try using large embroidery hoops which are cheap to get online or in charity shops/car boot sales etc. Being round brings additional challenges but they offer some potential advantages too being light weight and easy to travel with.

The Mesh (Silk)

The proper screen printing fabric (not actually silk these days) is fairly expensive. You can however buy enough for perhaps six A4 screens for ~£10 off ebay. Or you could save your money for paints and make do with what you can find.

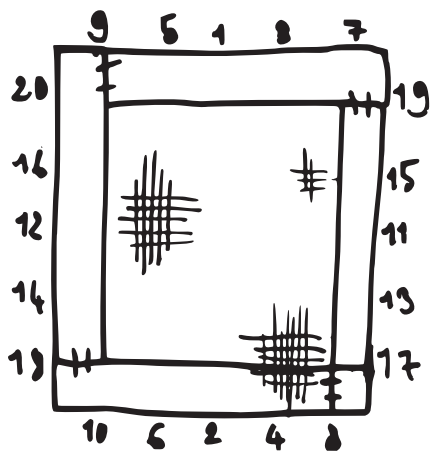
White or lightly coloured is best so you can easily draw on it. It needs to be sheer so when you hold it up to the light you can see the grid formed by the fibres and the little squares of nothingness in between. The proper stuff generally has 110 threads per inch, thats about 4 per mm but if you find fabric with 2 or 3 holes per mm then that will be fine. The best stuff I've found has been a fabric used for sheer curtains. As far as I can tell it's probably a polyester known as 'Chiffon' or 'Organza'. It's cheap to buy if you felt inclined to do so, perhaps £2 per meter - at least a third of the price of the proper stuff.

Apparently you can also use old nylon stockings/tights but due to their elasticity they'd work best with small frames, perhaps the embroidery hoop frames.

If you wet the fabric before you stretch it onto the frame, it will shrink a bit when it dries and end up even more taut. Ideally you should wash the material in hot water before use anyway to remove existing residues of detergent or fabric conditioner which might cause problems later on.

Fixing Mesh to Frame

Cut the mesh so it's a least 2" bigger all round than the frame. You want it as taut as possible without tearing it and evenly taut in all directions. Pin or staple down the centre of one side and then pull tight and do the opposite side. Now work towards the corners an inch or two at a time, doing the opposite each time. Once you have two sides, repeat the process with the other two.



Your screen will last longer if you seal the frame with polyurethane varnish or wood glue. At the very least, wrap the frame in gaffer or even masking tape.

Recently, after running out of staples, we used double sided sticky tape to hold and tension the mesh and then squirted wood glue between the frame and fabric to provide a more permanent bond. Glue can be used by itself, but it must be allowed to dry between tensioning alternate sides.

Squeegees

The squeegee is the tool used to press ink through the stencil produce on the screen. They have a rubber blade with a wooden or plastic handle and should be an inch or two shorter than the width of the screen they will be used with.



Proper screen-printing squeegees start at about £12/€15 (Speedball 23cm) and even the rubber itself is something stupid like £1 per inch!

Apparently you can use tile grout squeegees which cost about £3/€4 for 30cm. We've not yet tried one but they look promising. You would probably find that they would work better with the rubber cut in two along the length as they are very wide (and you get to make a second squeegee with the bit you cut off).



You will need:

Thin wood or plastic strips

Rubber strips

Staple gun or small nails

We made our own squeegees after being lucky enough to find some strips of fairly thick rubber. We sandwiched the rubber between two piece of thin wood using a staple gun to hold it together then wrapped the handle in gaffer tape. They work pretty well and can be made specifically to fit the size of the screens you use.

There doesn't seem to be much online describing making squeegees out of easily found materials. However, we did find one page which recommended wrapping a piece of inner tube or thin rubber around a stiff strip of thin metal sandwiched between two pieces of wood.

Other useful equipment

You can start printing with little more than a screen and squeegee but other stuff would be useful too. For example, overalls or an apron, plus rags and old newspaper, will help keep paint from getting on things it should not. Sisors enable you to cut up material for patches and trim them after printing. Rather than using the kitchen table, it's good to have a flat board (known in the trade as a platen) on which to place the things you are printing. It's also handy to have a rack or 'washing line' ready nearby on which to drape each item after printing, otherwise you'll soon cover every available surface. Having a blow heater (or hair dryer) speeds up drying screens and prints. Finally, an iron or heat press is needed if you want your prints made colourfast.

The Artwork

The low-tech approach lends itself best to fairly simply and bold designs. You can still get fairly intricate if you have plenty of patience but things with lots of detail or small writing will be pretty tricky and probably best done using photo emulsion. Basically, don't try to be too ambitious!

You will need:

An idea, pencils, paper

Wood glue and/or acrylic paint

A small fine paint brush

Getting 'Screen Ready'

Screen printing requires mono-tone artwork. Either ink is printed or it is not, there are no in-between tones, no greyscale. You need black and white line drawings. If you really want shading then it has to be done with lines, cross hatching or dithering with dots and you might want to reconsider using this low-tech approach.

If you were working with digital images things would be easy. Applications like Gimp or Photoshop have filters to convert colour or greyscale images into a mono-tone line drawings or half-tone filters which convert the whole image into a matrix of different size dots.

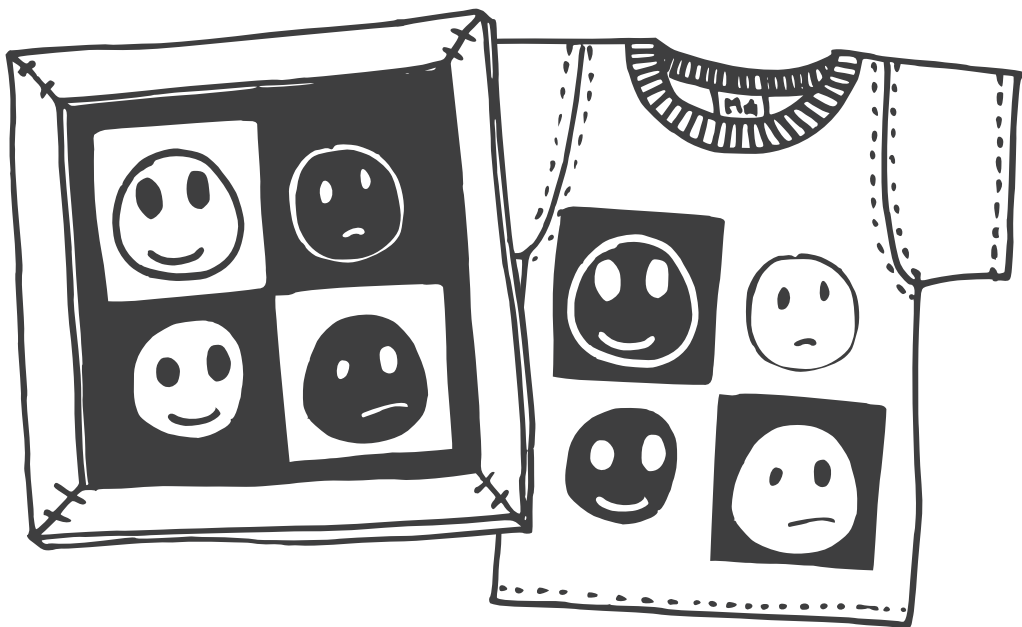


Positive or negative

Screen-print involves creating a stencil and what is printed will be the negative of what you put on the screen. You will be painting (or block out) the parts of the design which you don't want printed. So before you go any further you need to consider which parts of the artwork should be painted onto the screen and what should be left as open space.

For example, if you wanted to produce a smiley with two eyes and a mouth inside a circle, you could either paint the eyes, mouth and outline of the circle, or you could carefully avoid the eyes and mouth while painting both

outside and inside the circle but not the outline (ie. the negative). Mostly you'd want to produce a negative but sometimes it is easier to do all or some of the design as a positive. Think carefully about what this means and perhaps modify the artwork so that some bits can be done as positive if need be. With our example, you could make things easier by using a circle solid instead of an outline. This would give you the options of either painting the eyes, mouth and everything outside of the circle or just painting the inside of the circle while avoiding the eyes and mouth.





Transferring to screen

You start by drawing the design onto the mesh with a soft lead pencil or felt pen. This can be done either freehand or traced.

If need be, you can even trace directly off a computer monitor. Scale the image exactly to the size you need then place the screen over the display and start tracing. Be careful not to press too hard or mark the display with permanent ink! If your computer monitor is smaller than the image size to desire, don't worry, just zoom to the size you need and trace in stages to get the full image.

Blocking Out

Use a fine brush to apply either wood glue (not clear setting) or acrylic paint (any colour) to the negative parts of the artwork. Work on one area at a time to reduce the chance of smudging your work. If you make a mistake, use a damp cotton bud to wipe away unwanted paint/glue.

It is best to paint both sides of the mesh so that it is fully sandwiched by paint. Hold the screen up to a light to check for unintentional open space or pinholes as you work. When complete, allow to dry (ideally somewhere hot) and then it is ready for printing.

The Printing Process

You will need:

- Something to print on
- Ink (Acrylic Paint or Fabric paint)
- Squeegee and/or paint brush
- Access to running water

Ink & Substrate

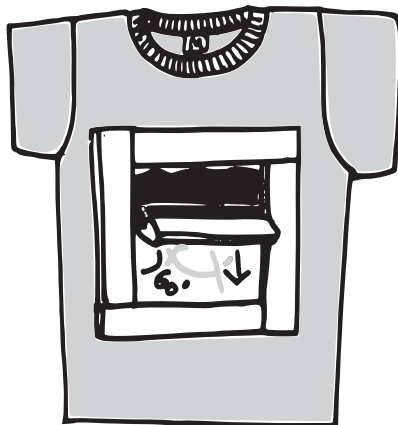
The thing you want to print on is known as the substrate, eg. t-shirts or scraps of fabric for patches. If you want t-shirts, save money and avoid buying new sweatshop labour industrial cotton by hunting down all the blank t-shirts you can find in charity shops, free shops and clothes recycling bins (the variety of sizes, styles and colours may also be advantageous). For patches you can often get cheap remnants in fabric shops (<£1 per meter) or just cut up old shirts, trousers etc.

Some fabric takes print better than others, eg. cotton t-shirts good, woolly jumpers bad.

Special ink can be purchased for screen printing but for those on a low budget ordinary acrylic is fine and fairly cheap (eg. £8 for 500ml). You need to think carefully about what colours to use. High contrast works best. eg. black ink on white is really easy (likewise, black on yellow). However, black or dark fabrics may show through when printing with white ink (which is often cheapest).

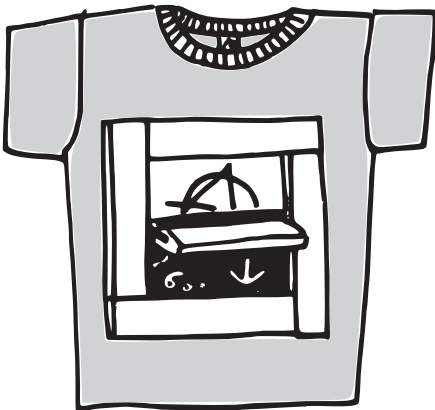
You can buy something called 'screen printing medium' which is a retarder for acrylic paint so that it dries slower to prevent clogging.

These printing methods also works for paper (and you can use cheap poster paint instead of acrylic). All the posters for the Brussels No Border camp were printed by hand. We've also successfully printed onto rolls of sticky backed transparent plastic to make window stickers.



Flood and Stroke

On a nice flat stable surface, spread out your substrate so there are no creases then place the screen where you want to print. It's usually a good idea to put some scrap paper under the material (or inside if printing on a t-shirt etc). Now you want to load the screen with ink by first placing a bead of ink across the entire width of the image about 1cm from the back of the screen. Holding the squeegee with both hands (and holding it at a 60 degree angle) you will make a flood stroke by pull the ribbon of ink towards you without applying any downward pressure. Returning the squeegee to the back of the screen you will make the print stroke in the same fashion, only this time you should apply downward pressure. Strictly speaking there should be just one print stroke but we generally find we need two or even three.



Multi-coloured printing

There is nothing to stop you using more than one colour at a time. You can create gradients by blending two or more colours when placing the bead of ink before the flood stroke. Alternatively, instead of a conventional flood stroke, use a brush to gently apply different colour inks directly to the parts of the stencil you want them, then continue to the print stroke.

Another option is overprinting. This involves printing again with another colour, perhaps slightly offset to create a shadow or 3D like effect (this is a good way to recover from having printed something poorly). Alternatively you could use of just part of the stencil when overprinting or use a completely different screen!

It is handy to have a few different sized squeegees, brushes and mixing bowls when working with more than one colour. Some quick method of drying screens will also help.



Finishing up

Do the washing-up!

You must not let the ink dry onto your screen! Acrylic paints can dry really fast in warm weather and you might only manage half a dozen print before it starts to clog. In winter we've knocked out over 200 prints without needing to wash the frame. Don't take risks, if it dries then your screen is ruined! Wash the paint off before it clogs using cold water, preferable a high pressure jet. Hold a finger over the end of the tap or hose and expect to get wet. Shake it dry before continuing - or better still, use a blow heater or hair dryer.

Don't forget to clean all the ink off your squeegee and brushes etc.

Drying & Curing

Dry is not the same as cured. If you want your t-shirts/patches to survive a visit to the laundrette then you must apply heat to cure the ink otherwise it may wash out.

Place a plain sheet of paper over the image and then use an iron (hottest setting, no steam) for 3 to 5 minutes. Yes, it will take a really long time to do properly if you have printed loads.

A commercial heat press or flash cure unit is expensive. You could try a trouser press or other heating methods if you are careful (we tried putting patches in a preheated oven!).

Jargon Buster

Artwork: Common term for an image or text to be used for printing although not necessarily ready to transfer to screen. Screen Art refers to artwork that is already set up for the screen printing process.

Bleeding: Migration of ink outside of intended printing area, perhaps due to too many print strokes or watery ink.

Blockout: Both the process and substance used to cover open areas of mesh in order to form a stencil resisting the flow of ink.

Clogging (or Plugging): Ink drying on the stencil unintentionally thus preventing further ink flow through the stencil.
Colourfast: The ability of dyed fabric or print to retain its colours over repeated washings.

Colour Separation: Creation of separate images for each colour in a design which can then be printed in sequence to reproduce the original.

Emulsion (or photo emulsion): Light sensitive chemical which usually comes as two parts (emulsion and sensitizer) to be mixed before use. It goes hard when exposed to light and can no longer be washed out with water.

Mesh Count (or T count): Number of threads in one square inch of screen fabric, measured in both directions. The higher the number, the smaller the openings.

Opacity: An ink's ability to cover the underlying color of the substrate.

Open Area: The area of a stencil that the ink passes through.

Pinholes: Tiny unwanted open spaces on the screen.

Registration: The process of lining up the images for overprinting.

Serigraphy: The technical term for screen printing or silk screen printing.

Stencil: The portion of the screen containing open areas and blockout forming the image to be printed.