

INTRODUCTION TO SILK SCREEN PRINTING:

The Silk Screen:

As the name suggests, these screens were originally made from fine silk mesh, today however a monofilament /multifilament polyester or nylon mesh is generally used. In commercial mechanised silk screen printing the mesh most commonly used for textile purposes is type 68/2HD. This represents the number of threads per square centimetre of woven mesh. HD represents the thickness of the thread and stands for heavy-duty thread; there are two threads on the warp and the weft instead of one. Monofilament mesh is made from single strands of filament whereas multifilament mesh is made of multiple strands of filament during the weaving process. In order to create a silk screen frame the mesh is first attached to pins at the side of a large hydraulic frame, which stretches the mesh. The tension of the mesh is assessed using a tension gauge, which is placed on the stretched surface of the screen mesh. The screen frames are attached to another frame under the stretched screen mesh. The frames are brought up to meet the taut mesh and glued into place. Excess mesh is removed and the screens are left to dry. The finer the mesh used (the higher its gauge) the finer its quality of marks, lines and definition of the printed image.

Silk screen is a development of stencilling, based on techniques first developed in Japan around the 8th C. These early processes involved cutting out a stencil from papyrus or lacquer coated paper, then brushing the colour through the stencil. The hand -silk screen printing method was introduced in the 1920's and 30's as a quick and cheap way of printing designs for viscose and acetate rayon's (artificial silks) instead of using block printing or copper engraved roller printing techniques.

The Photo Silk Screen Process for Flatbed Screen Printing.

Coating the Silk Screen:

When flatbed photo-silk screen-printing is done by hand a fine fabric/mesh (silk, nylon, polyester or metal gauze) is stretched over a wooden or metal (usually aluminium) frame. Sections of the screen are blocked out so that dye cannot penetrate through them. This is usually done by coating the screen with a light sensitive screen emulsion. The screen is placed in an upright position approximately 30 degrees and with the stretched side of the screen uppermost. A quantity of emulsion is poured into a coating trough and is applied to the surface of the screen (starting at the bottom of the screen just inside the frame area) with a firm smooth action. It is important to coat evenly, as any inconsistencies during this process could effect the quality of the final image. The screen is generally given a single coating but in certain circumstances i.e. (long print runs) more than one coat may be applied. As a protective measure it is also advisable to wear gloves in order to avoid direct contact with the screen emulsion. Although present day emulsions are far less hazardous than their predecessors irritation to skin can still result if too much contact is made. Once coated the screen is left to dry flat in a darkened room for approximately 45 minutes. It is worth noting that in liquid form the emulsion is not immediately effected by daylight, this means screens can be coated in relative daylight conditions. Once the emulsion is dry screens should not be exposed to daylight conditions for any length of time as this could effect the whole process.

Exposure To The Light Source:

The acetate containing the image (refer to Preparing An Image For Exposure etc overleaf) is firstly reversed and placed on to the mesh as central as possible in order to maximise the print area of the screen, it is then attached to the screen (with stretched side of the screen

uppermost) using transparent tape. The screen with attached image is placed face down on to the glass surface of the Print Down Frame Unit:

Using The Print Down Frame Unit:

The print down unit is a specially designed vacuum bed, which is used to house the silk screen prior to exposure to an ultra violet light source. Clear visual instructions are given in the safe handling of all equipment during the workshop.

- 1) Once the screen is placed in the machine (a piece of plastic tubing is placed near the outside the edge of the screen and inserted into one of the outlets in the inside of the frame cover, the cover is clipped into place and the vacuum pump is switched on. In about 15 seconds the air will be extracted from the print down frame forming a perfect contact between silk screen and image. The machine is then tilted into a vertical position and the screen is now ready to be exposed to the light source
- 2) The light source is a mobile unit, which can easily be manoeuvred into the most suitable position for screen exposure. It should be switched on 5 minutes before attempting to use it for exposures; this enables the bulb to reach maximum U.V. level. Once the light source is switched on it should remain on for the remainder of the day; this economises greatly on bulb usage and prolongs its life.
- 3) Once the print down frame has been tilted into the vertical position the light source can be activated. There is a timer which can be adjusted to vary exposure times according to distance and area of image to be processed. The set time for general use is 3 minutes a lot depends on the opacity and detail of the required image. Once the timer switch is activated automatic doors open and allow the time exposure to occur. After the set period of time has elapsed the automatic doors close and ensure that over exposure is avoided.
- 4) The frame is then tilted back into the horizontal position and the vacuum pump is switched off. The clips can be immediately released and (after firstly removing the secured acetate from the underside of the screen) the exposed screen is placed into the screen wash bay and hosed down on both sides with cold water. Care must be taken at this stage not to use any abrasive actions whilst washing out the stencil because the emulsion can still be very sensitive. The image area of the acetate has protected the emulsion from the U.V. and in these areas it has remained light sensitive. These areas start to break down when washed from the silk screen, the unprotected areas of the screen have now been hardened by the U.V. and remain intact when the silk screen is washed. It is this action that creates the finished stencil and after checking that all of the image has developed successfully the screen can now be removed from the wash bay and placed horizontally (stretched side uppermost) on to a flat surface.
- 5) The screen can now be taped up, this involves taping/masking out with gum based tape any areas of the screen which have not been protected by the hardened emulsion. Additional areas of the screen may also require re-touching with emulsion and a paintbrush prior to printing. Once the screen is taped it is placed in the heating cabinet and allowed to dry (stretched side uppermost) for approximately 30 minutes, it is then ready to use.
- 6) The finished silk screen will withstand a considerable amount of use as long as it is washed quickly between print runs (leaving print pastes in the screen for any period after printing will cause inks to harden and permanently block the silk screen) which will then render it unusable.