SCREEN PRINTING
STANDARD OPERATING PROCEDURE

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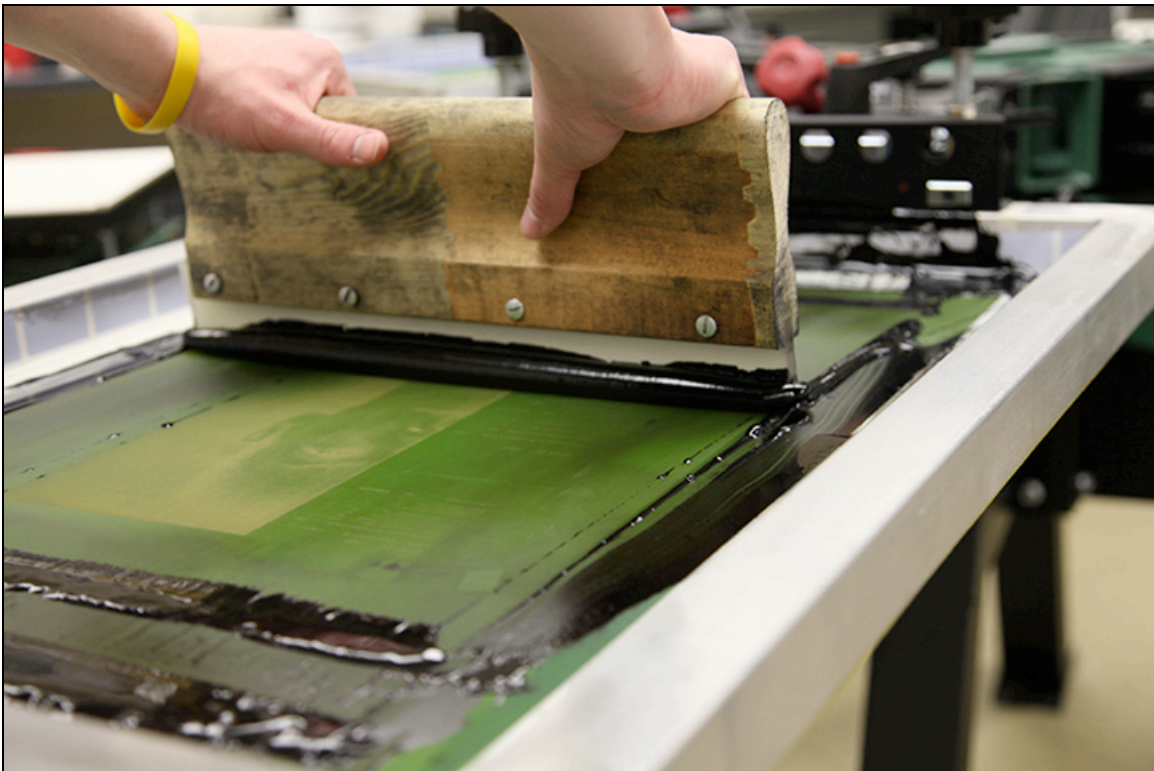Mitchell Morgan, Undergrad Student, BS, Media Arts and Technology

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1. PURPOSE

The purpose of this document to present a standard operating procedure for the operator to successfully carry out the process of Screen Printing accurately and always in the same systematic manner to achieve consistency. The instructions will provide all the required details and decision branches required to perform the procedure, and are to be followed without deviation.

2. SCOPE

This document will cover all steps of Screen Printing in a detailed manner. Still images will be provided for better understanding of the procedure. Links to videos will be made available wherever applicable for a deeper understanding of the process.

Assumptions have been listed before each major step to ensure the operator is ready to proceed to the next stage. The instructions will allow the operator to successfully undergo the process of Screen Printing.

3. DEFINITIONS

- Mesh value – Different mesh sizes are used for different applications in the screen-printing process. Mesh size is measured by how many threads of mesh there are crossing per square inch. For instance, a 110-mesh screen has 110 threads crossing per square inch. The higher the mesh count, the finer the threads and holes are in the screen.
- Squeegee – an implement edged with rubber or the like, for forcing paint, ink, etc., through a porous surface, as in serigraphy.

4. BACKGROUND

Screen-printing is a technique completed by a mesh used to transfer ink onto a substrate, except in areas made impermeable to the ink by a blocking stencil. A blade or squeegee is moved across the screen to fill the open mesh apertures with ink, and a reverse stroke then causes the screen to touch the substrate momentarily along a line of contact. This causes the ink to wet the substrate and be pulled out of the mesh apertures as the screen springs back after the blade has passed. This process of using a mesh-based stencil can be used to apply ink onto substrates such as T-shirts, posters, stickers, vinyl, wood, or other material.

5. WORK INSTRUCTION – SCREEN PRINTING

5.1 Step 1 – Screen Prep

This step will help you prepare the screen to carry out further operations. You will need to:

- Determine appropriate screen mesh
- Look to narrow edge of screen frame for mesh value

A. Clean Screen (V)

1. Wet screen with water using spray gun	
2. Apply degreaser on 1st side of screen	

3. Scrub screen in circular motion covering entire surface area	
4. Repeat process for 2nd side of screen	
5. Let screen stand for 2 minutes to actuate degreaser	
6. Thoroughly rinse screen until all degreaser is removed	
7. Use compressed air hose to dry screen	

B. Frame Emulsion Coating (V)

1. Load emulsion into scoop-coater (load amount commensurate with number of screens)	
2. Tilt scoop-coater such that lead edge creates an even bead of emulsion across the bottom of the narrow edge of screen	
3. With a consistent pressure and motion, move scoop-coater up the screen leaving an even thin film of emulsion	

4. Repeat process 2 times front side and 1 time back side	

5.2 Step 2 – Screen Art Prep

Steps:

1. The screen printing process requires black and white artwork that is pre-trapped and separated by each screen printing color
2. Screen printing artwork requires very high contrast originals with deep black (DMAX__ and crisp edge definition (edge aguity)
3. RIP and PRINT (SMS Lab AccuRIP)
4. PRINT ART from Adobe Illustrator using separation option AI native file format
5. PRINT TO: AccuRIP EPSON 1430. The EPSON 1430 printer has been specially configured to image multiple black to achieve required density.
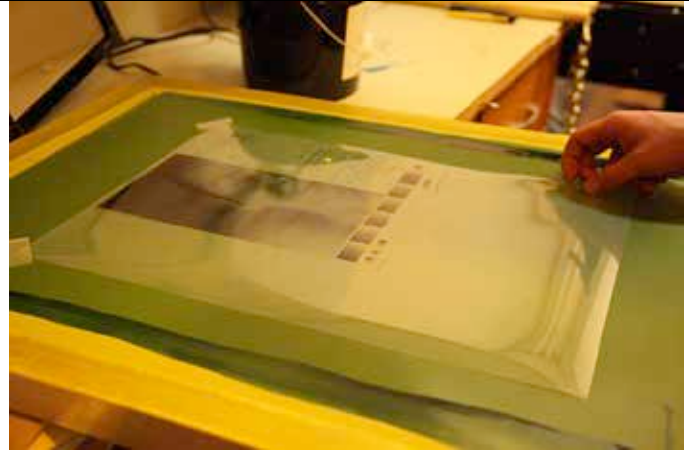
5.3 Step 3 – Screen Exposure

Assumptions:

- Screen is clean
- Screen is emulsified, etc.

Steps:

1. Position artwork on screen frame such that image is right reading as you look through the squeegee side of the screen frame.
2. Make sure artwork is positioned such that top of artwork aligns with tape mark on screen frame and is positioned parallel to frame using a 'T'-Square.

3. Once artwork is properly positioned tape top right/left corner to screen using 3M clear tape	
4. Place Screen Frame onto exposure unit with print side down	
5. Close and lock down exposure frame	
6. Check exposure time (1:45)	

7. Turn on exposure frame vacuum	
8. When screen frame is completely pulled to glass, frame is ready for exposure	
9. Turn on exposure lamp	

10. Once exposure is complete, turn off vacuum and open exposure frame and remove art from screen frame	
11. Remove un-exposed emulsion by first rinsing "PRINT SIDE" of Screen Frame with **warm** water spray nozzle in wash out booth and repeat for squeegee side	
12. Cure emulsion by turning on light in wash out booth. Let cure for 15 seconds	

13. Follow emulsion cure stage – re-rinse screen frame – print side first followed by squeegee side	
14. Once rinse is complete, use compressed air to carefully evacuate all water and dry screen	
15. Once screen frame is dry, it is ready for the printing stage	

5.4 Step 4 – Screen Press Prep

Assumptions:

- We have a functional screen that is cured and cleaned and ready to use

Steps:

1. Place the screen frame (print side down) over trash can	
2. Take 3 inches "split tape" (white-sticky/blue less-sticky)	
3. Take screen frame from frame edge in to overlap emulsion part of screen frame (blue to screen frame edge, white over screen) – lightly burnish tape to secure to screen/frame	
4. Complete for all edges of frame until there is no screen gap	
5. Check screen for pinholes in emulsion, use red block-out solution to fill pin holes	

6. Repeat for all screens	
7. Mount frame(s) on screen press with head of screen frame positioned into screen press clamp (print-side down). Be certain to square frame in clamp	
8. Pull head down to print position, then make final (minor) adjustments (center/square image) prior to tightening head clamps	

5.5 Step 5 – Screen Print Process

Steps:

1. Select ink and scoop enough ink to cover a 2" thick bead below image toward clamp edge (approx. 8 oz of ink to start)	
2. Lift screen head back up to open position for placement of material to be printed	
3. Position test material on press	

4.	Squeegee first pass (flood-coat) of ink firmly through screen onto test material, follow with imaging coat by applying consistent firm pressure while squeegeeing across screen	
5.	Repeat for each station as required	
6.	Bead of flood-coat toward operator	
7.	Tilt squeegee 45° (away from operator toward clamp)	
8.	Apply firm and consistent squeegee pressure as you move squeegee across image area in a steady singe pass motion forcing even floor of ink through onto print material	

9. For <u>single color printing</u> complete task by positioning the squeegee handle against clamp with ink side on screen	
10. Lift frame and remove printed material	

11. Material drying:
 	
• Turn on drying unit to warm up device
• Set transport feed speed:
   - Paper – xx
   - Cloth – xx (cotton t-shirt)
• Set dryer temperature:
   - Paper – xx
   - Cloth – xx	

Caution: Adjust temperature and transport speed appropriately with various material (check with staff or faculty for required setting)

Multi-color screen-printing:

Assumptions:
- Operator has successfully followed the procedure for a single color printing and is now ready to image additional colors.

Steps:
1. Position the "flash-dryer" into place over one print station (usually next to the first-color printing station)
2. Rotate screen press platen carousel (bottom of screen press) to position first-color under flash dryer
3. Turn on flash dryer (High) for 5-10 seconds (±) to dry ink on image surface. Check to make sure it is dry – repeat if necessary
4. Ink should be dry to touch to insert proper coverage and trapping for next color printing
5. Position next color screen frame into adjacent unit – clamp lightly since further adjustment will be required for precise registration
6. Rotate platen carousel such that first color image is now in position under 2nd color screen frame

7. Position screen frame down over (dry) image and loosen clamps to make fine-tune registration adjustments of 2nd image to 1st image
8. Secure screen frame clamps tightly when registration is achieved
9. Repeat this process for each additional color

5.6 Step 6 – Screen Press Clean-up

Steps:

1. Position a blank sheet of paper under each screen frame to make sure no ink leaks onto platen

2. Take squeegee(s) to ink supply can and remove excess ink with ink knife making certain not to contaminate the ink

3. Use ink knife to remove all excess ink on each screen frame and return excess ink to ink can making certain not to contaminate the ink

4. Take a cloth shop-rag (red/pink) and moisten with press wash and carefully wipe down screen frame and squeegee. Repeat as rag gets saturated with ink

and until screen frame and squeegee are mostly clean and free of ink	
5. Take one blue paper shop rag, moisten with press wash and complete a final cleaning pass on screen frame and squeegee. Repeat if necessary until screen frame is completely clean	
6. Discard cloth shop rags into appropriate receptacle and paper shop rag into trash	
7. Check screen press, floor and counters to make sure the entire work space is clean	
8. Remove and discard split-tape from screen frame	
9. Return screen frame to screen reclamation area	

5.7 Step 7 – Screen Frame Reclaim

Steps:
1. Position screen frame in wash-out booth
2. Rinse both sides of screen frame with water (pressure washer wand)
3. Spray emulsion remover on both side of screen frame
4. Allow emulsion remover to work for 2-3 minutes
5. Pressure wash the 'print side' of screen frame until all emulsion has been removed
6. Let screen frame stand dry

Note: If screen frame has a haze due to ink, repeat above process this time using haze remover