

Micro Printing Systems TF-100 Screen Printer – Operating Procedure



Updated: Feb. 2022

Key Vendor Information:

Printer: MPS International (<https://www.mps-intl.com/tf-100-screen-printer>), tech service: John Little (jlittle@mps-intl.com)

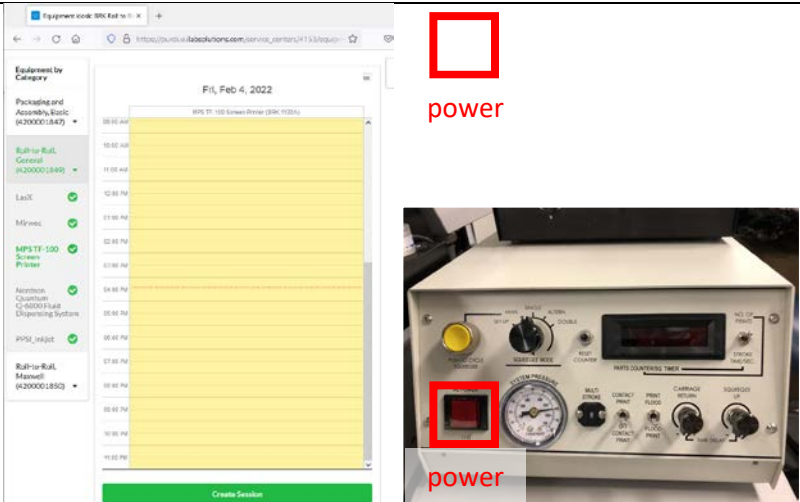
Screens: NBC Meshtec, tech service: Yuhi Ogawa (yuhi@nbcmeshtec.com)

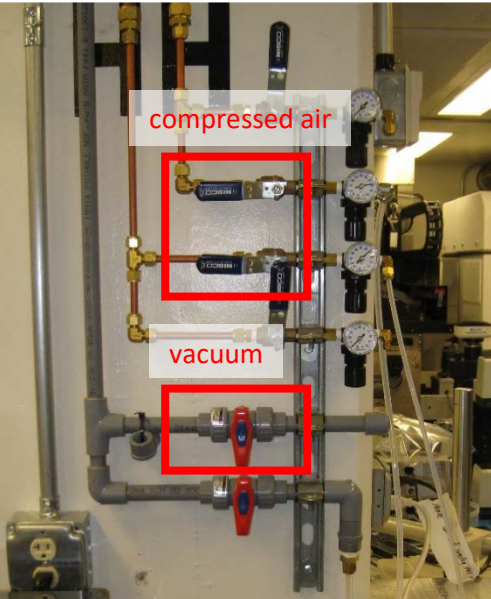
Inks: Insulectro (DuPont inks)

1. **Switch on the Oven**

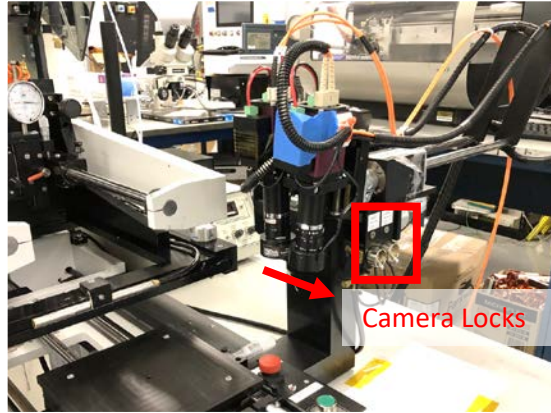
<p>1.1. Turn on the oven and warm it up to the temperature recommended by the paste manufacturer for curing or drying printed parts.</p>	
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2. **Login / Set utilities**

<p>2.1. Log in to the “MPS TF-100 Screen Printer” in the Birck Roll-to-Roll Core in iLabs. Power to the control box is typically always on after logging in. If the power is still off after logging in, make sure the “AC Power” button on the control box is depressed.</p>	 <p>The screenshot shows the iLabs interface with a list of equipment. The 'MPS TF-100 Screen Printer' is highlighted. To the right, a photo of the control box is shown with a red box around the power switch, labeled 'power'.</p>
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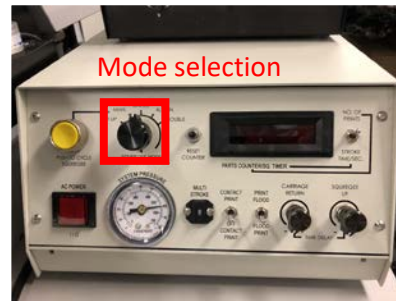
<p>2.2. Open both ball valves to provide compressed air to the pneumatic systems of the printer. If you plan to use the vacuum chuck on the stage to hold your sample, also open the ball valve on the vacuum line. These valves are found on the wall near the machine. See photo.</p>	 <p>The photo shows the pneumatic system wall with two red boxes highlighting the 'compressed air' and 'vacuum' valves.</p>
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2.3. Unlock and move the cameras as far from the print region as possible (toward the user and to the right) and lock into place.



3. Load screen

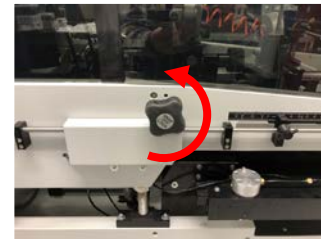
3.1. On the control box, switch to "Set-Up" mode.



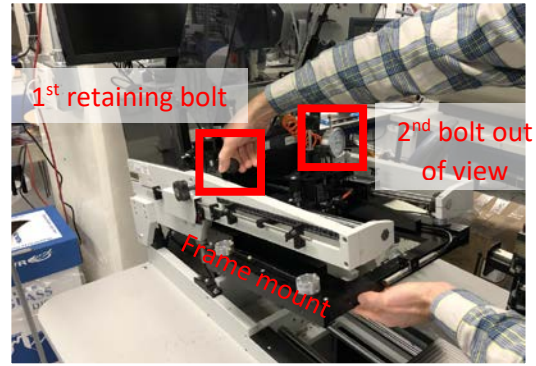
3.2. Using the toggle switch to the left of the stage where the substrate is mounted, raise the "Print Head UP."



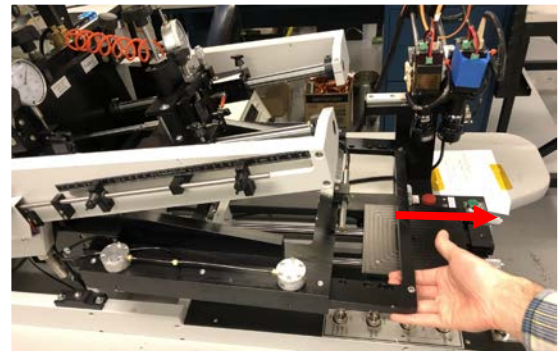
3.3. Make sure the "Snap Off Lock" knob on the left side of the machine is loose.



3.4. While holding the frame mount so that it will not fall, loosen and raise the two retaining bolts near the back of the region under the hood. After the retaining bolts are loose, lower the frame mount slowly by hand.



3.5. Slide out the frame and remove the screen from the frame (if present). Screw in the desired screen with 3/16" hex key. Make hand tight, but do not overtighten. NOTE: Arrange screen so that fine features are parallel to the printing direction (front to back).



3.6. Slide the screen/frame assembly back into the slots on the machine. Raise the frame mount assembly. While holding it in place, tighten retaining bolts until each one "clicks".



3.7. Engage the "Screen Frame Clamp Lock" (toggle switch to the left of the stage).



3.8. Make sure there are no interfering objects and if not, lower the print head using toggle switch to the left of the stage (“Print Head DOWN”).



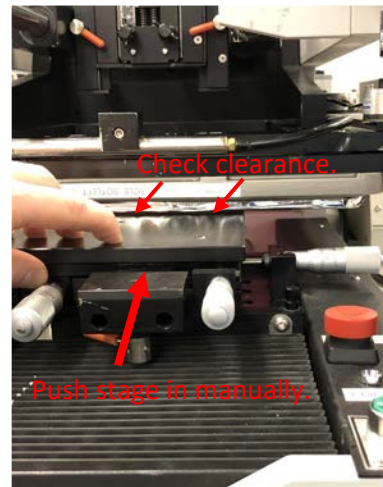
4. Check Screen Clearance

4.1. If your substrate is more than 150 micrometers thick, place it on the stage and fix it in place.

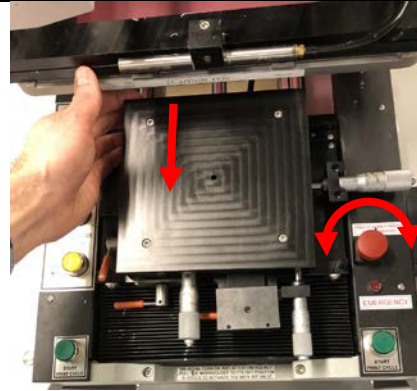
4.2. Push the Emergency Stop (large red button to the right of the stage). “Emergency” red LED will illuminate.



4.3. Manually slide the print stage under the screen to check clearance. Raise the screen height (if necessary) using the central knob at the far back of the machine under the hood (see step 4.3 for a photo), so that there is no collision between the stage and the screen.



4.4. Once the stage clears the screen, release the E-stop by twisting the red button. “Emergency” red LED will turn off. Slide the stage back to its original position; it will lock into place as it makes a “hiss” sound.

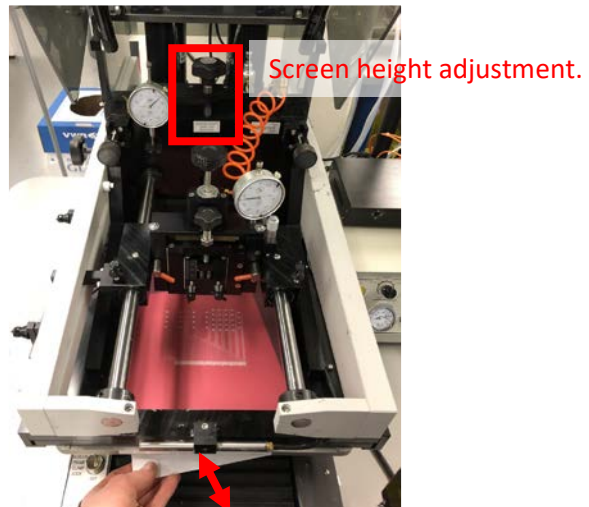




5. Set the Snap-Off Distance

5.1. Press both green “Start Print Cycle” buttons simultaneously. The pneumatic system will move the print stage will move under the screen.

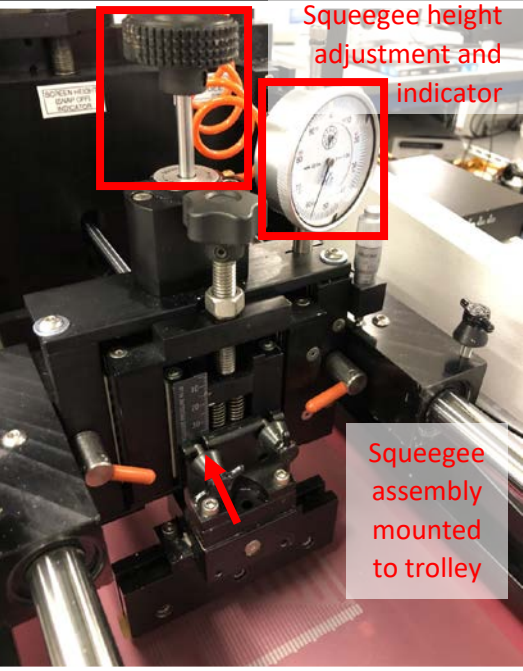


5.2. Place a piece of paper between the stage (or thick substrate, if present) and the screen. Slowly lower the screen height using the central knob at the far back of the machine under the hood. While lowering the screen, gently move the paper back and forth until frictional resistance is sensed when the screen contacts the paper. Stop lowering the screen at this point of contact; lowering further can cause irreparable damage to the screen.



<p>5.3. From the point of contact, raise the screen height 40 to 50 mil. This gap between the screen and the stage (or thick substrate, if present) is the snap-off distance.</p>	 <p>Screen height adjustment knob.</p> <p>Screen height indicator (in mil).</p>
<p>5.4. Turn the “Snap Off Lock” knob on the left side of the print head until it is finger-tight. Do not over-tighten.</p>	

6. **Set the Squeegee Height**

<p>6.1. Fit the squeegee assembly onto the retaining pins on the moving trolley. If there is interference with the screen, first raise the squeegee height until the squeegee assembly fits (middle knob on the trolley).</p>	 <p>Squeegee height adjustment and indicator</p> <p>Squeegee assembly mounted to trolley</p>
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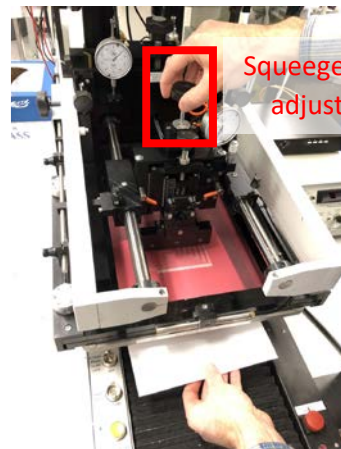
6.2. Ensure that the squeegee assembly is pushed flush against the back surface of the moving trolley. Hand tighten the wing nuts.



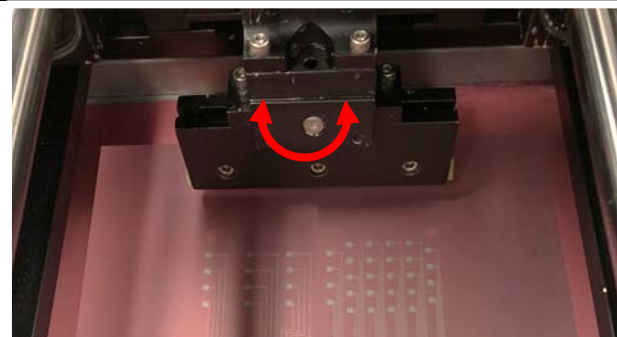
6.3. Move the squeegee to the center of the pattern. Use the jog buttons and check the location on the scale on the left side of the machine.



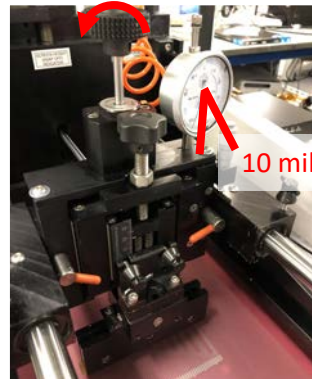
6.4. Place a piece of paper between the stage (or thick substrate, if present) and the screen. Slowly lower the squeegee height using the middle knob on the trolley. While lowering the squeegee, gently move the paper back and forth until frictional resistance is sensed when the screen contacts the paper. Stop lowering the screen at this point of contact.



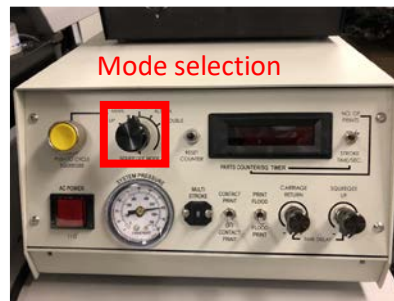
6.5. Check the tilt of the squeegee to make sure it is level by feeling if the paper is tighter on one side of the squeegee or the other. If necessary, raise the squeegee fully out of contact and gently rotate the squeegee about its central axis to level it out. Repeat step 5.4 and 5.5 until the pressure at the point of contact feels even across the squeegee.



6.6. From the point of contact, lower the squeegee an additional 10 mil past contact to apply the prescribed pressure to the squeegee.

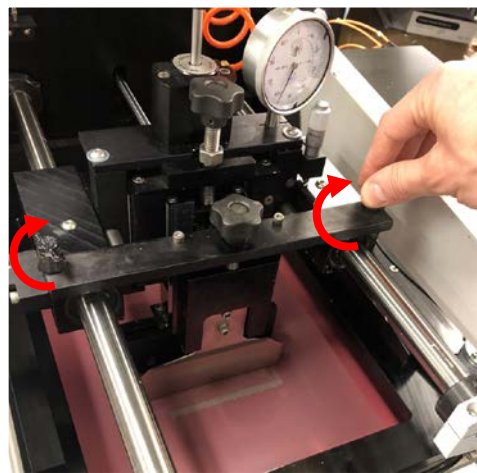


6.7. Clear anything from the path of the stage and then switch to “Single” mode on the control box. The squeegee will be pneumatically raised and the stage will move back to its home position.



7. Flood Bar Set-Up

7.1. Double check that that control box is in “Single” mode before attaching the flood bar, as damage to the screen can result if it is not. If it is, attach flood bar to moving trolley with thumb screws.

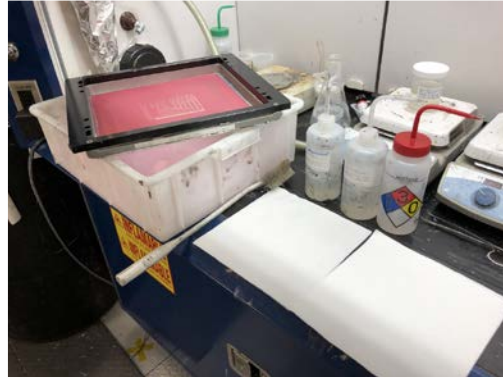


7.2. Check gap height with 0.5 mm shim. Adjust height if needed. Be careful not to push against the screen when using the shim to check the gap, as this can lead to incorrect gap setting when the screen snaps back.

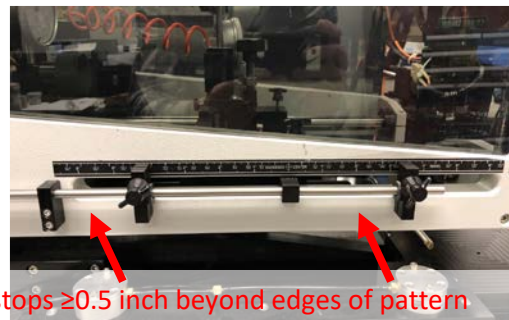
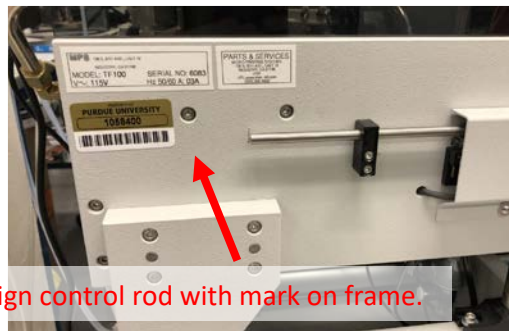


8. Printing

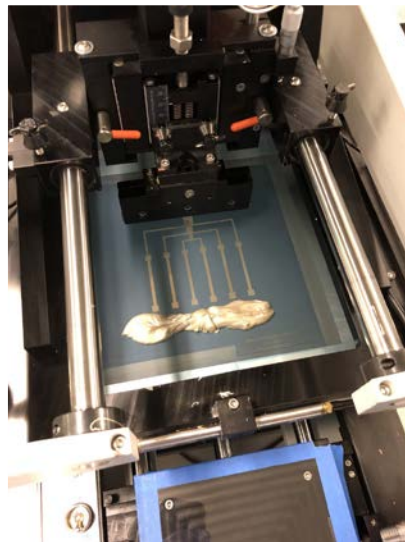
8.1. Prior to printing, set-up solvent tray (on floor behind/beneath printer), solvent bottles, brush, and plenty of paper towels in the solvent hood. (Photo shows screen as well, but it should still be installed on the printer at this point.)

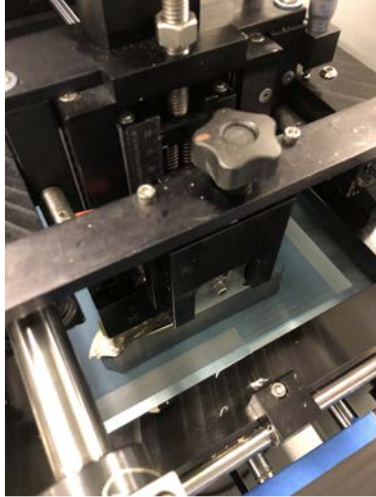
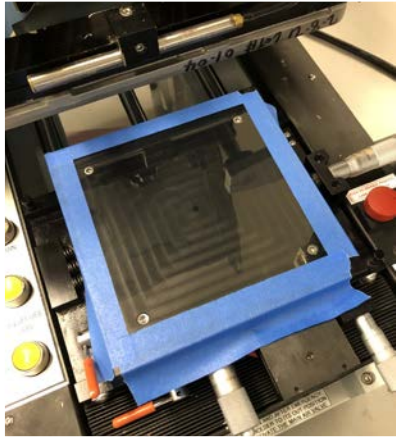



8.2. Use the jog buttons to check the range of motion of the squeegee and ensure it will pass at least 0.5" beyond either end of the pattern. (Make sure the end of the control rod is lined up with the mark on the side of the machine before adjusting.)



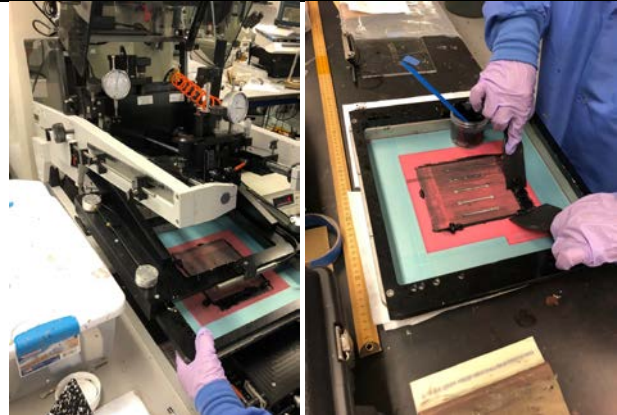
8.3. Jog squeegee to the end of the pattern farthest from the operator. Remove the flood bar. Pour or use a spatula to spoon paste in a berm near the edge of the pattern closest to the operator (but ideally not on top of the pattern). Aim for a 0.5 to 1 inch wide strip of paste that is about the same length as the squeegee.



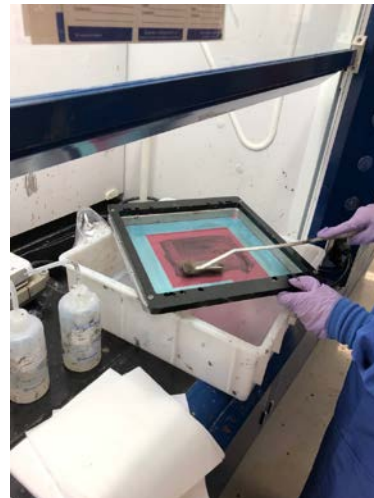
<p>8.4. Jog squeegee to the end of the pattern nearest the operator. (It may pass over the strip of paste.) Replace the flood bar so that all of the paste is behind the flood bar when viewed by the operator. If necessary, manually push the paste away from the operator with the flood bar when attaching it so that it ends up in this configuration.</p>	
<p>8.5. Tape the substrate to the print stage. Take care that the substrate is flat (no air between substrate and stage) and cannot move. Also take care that no tape is exposed above the surface of the substrate.</p>	
<p>8.6. When completely prepared, press both green "Start Print Cycle" buttons at the same time. For the very first cycle, this may need to be done a second time, because the first cycle will find the print range limit.</p>	
<p>8.7. Remove the print from the print stage and place it in the oven for the time prescribed by the paste manufacturer. Repeat steps 8.5-8.6 for the number of prints desired.</p>	


9. Clean-Up

9.1. Raise the print head. While holding the screen frame mount so that it will not fall, loosen and raise the retaining bolts. Carefully lower the screen frame mount manually. Remove the flood bar and squeegee assembly. Using the plastic putty knives, gather excess paste from the flood bar and squeegee assembly and return to jar to be reused. Slide out the frame and screen. Place the screen on clean towels on a flat surface. Using the plastic putty knives, gather excess paste from the screen and return to jar to be reused.



9.2. Move the frame and screen over the solvent tray in solvent hood. Apply Rhinotech SW210 solvent and rinse and scrub gently with brush. Wipe with towels. Repeat until majority of paste is gone. Continue clean-up by rinsing with Rhinotech PW125 solvent and wipe with towels until towel is clean after wiping. Check carefully that no paste residue is left on the screen. **NOTE: Do not allow solvent to touch the edge of the screen, because it can dissolve the adhesive holding the screen to the aluminum frame and release the tension, rendering the screen unusable.** Place soiled or wetted towels in an open plastic bag in the hood and allow solvent to exhaust for 24 hours before disposing of the towels.



<p>9.3. Clean the plastic putty knives, flood bar, and squeegee assembly with acetone and paper towels until no paste residue is left on these items. (Remove screws to disassemble squeegee from its holder to clean it completely. Reassemble when done.)</p>	
<p>9.4. Rinse brush with acetone and wipe with towels, wipe out solvent tray with towels. When dry, return the solvent tray and brush to its original location.</p>	
<p>9.5. Unscrew screen from frame and return screen, frame, flood bar, squeegee assembly, and any tools to their original location. Raise the frame mount and secure the retainer bolts; lower the print head. Turn off gases and vacuum lines on the wall behind the machine. Log out of labs.</p>	