MURAKAMI

March 2011

Technical Newsletter

MURAKAMI SCREEN U.S.A., INC. *745 Monterey Pass Rd. Monterey Park, CA 91754 Tel 323.980.0662*

Who's running the Shop?

As a company grows an owner may have moved from a labor position to a management position. Gone are the days when screens were prepared correctly. Owner's look around the shop as they grow and replace themselves with the highest qualified candidate available. In today's tough economy it is rare to hire highly qualified screen makers and production management personnel, rather those positions go to recently hired workers who have taught themselves enough about the job to accomplish the tasks. However as we will see many techniques and practices disappear along with best practices to create strong stencils. Often it isn't the owner who runs the shop any longer, its the lack of training and skill sets that determine profitability.

I get the call:

"I've got some bad emulsion here, its falling off the screen."

A conversation begins, often starting at screen making 101, and then progressing to product knowledge. Too often the screen maker was promoted from screen reclaiming and before that he may have been a screen washer. In my shop if you could deal with cleaning plastisol screens for 30 days you passed the test and became a candidate for a better job, often assisting screen reclaiming, or development. As the worker progressed he may get to coat screens, then shoot them when the shop gets real busy. His training may have been minimal. The screens look the same as any others but too often the screen room develops habits that lead to poor performance on press.

So lets look at Screen Making 101.

First: Ambient Conditions

The screen room and surrounding area need the following conditions:

1. Humidity: 35%
Buy a temperature and humidity gauge to accurately know ambient conditions in your screen:

Keep humidity low, 35% is a good level. If your screen room stays at 50% plus, or you live in a rainy or foggy area, get a de-humidifier.

2. Keep floor free of water and dirt. Water will increase humidity, dirt will create pinholes.

3. Fans - Keep them off the floor. Fans placed on the floor stir up dust and dirt that create pinholes.

4. Mop floor nightly, keep door shut. You say you cover your floor in cardboard? Why? When it gets old it breaks down to dust causing pinholes and weak areas in your screens.

5. Dry fans in racks, leaning them against a wall and blowing a fan on them will blow dust on wet emulsion causing pinholes.

6. Make sure screen room is large enough. I have seen bathrooms as screen rooms, with 30-40 wet screens inside. The screens will never dry properly, the water from all those screens stays trapped in the small room. When screens are exposed from a room like this the exposure is incomplete.

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Ambient Conditions Cont.

When wet screens are dried next to already dry screens, the dry screens absorb all the water evaporating from the wet ones. Build a larger screen room, or get a dehumidifier for cramped situations to accelerate the drying process.

Dehumidifier

7. Be aware of weather. Rainy days will require more dry time, cold weather may require heating the screen room. Keeping constant room temperature at 72-80 degrees and humidity at 35% helps create predictable exposures that will not breakdown on press.

Second: Equipment

1. Dehumidifier - As mentioned already a dehumidifier keeps the air dry, which in turn promotes, predictable drying times for the emulsion. Set it to 35%. During demos of our emulsion it's one of the first things I ask, especially if my temp/humidity gauge is reading 70%

"Yeah we have one, it's over in the corner." Often it isn't even turned on, just gathering dust and in this case it's running the shop and determining screen weakness instead of screen strength.

2. Scoop Coater - My next question after seeing a one edged worn scoop coater is "How old is that scoop coater exactly?" I have clients who use their 'magic' scoop coater that is over 20 years old. No dull side to obtain good EOM on coarse mesh, no end caps to use that maintain the proper angle to the mesh.

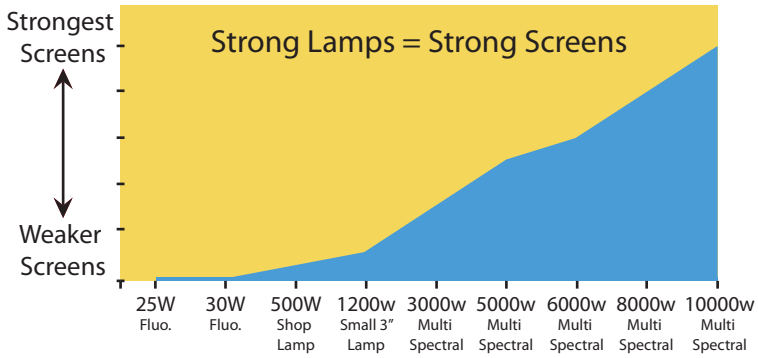
Worse when laid on a light table's glass there are gaps between the edge and glass where it has worn. Looking down the edge it has waves in it. No wonder discharge printing is a headache, EOM on a screen can vary dramatically with old worn coaters from edge to edge. Exposure times may work for some areas, but be too little for thick areas, the result? Lots of breakdown on press, lots of rejects, lower profit margins.

3. Exposure Unit - FYI: There is an entire previous article dedicated to the exposure process:

http://www.murakamiscreen.com/documents/EmulsionExposureTipsOptimized.pdf

What you need to know:

• ***The higher the exposure lamp wattage the stronger the screen***. Especially for water base and discharge printing. Choose a multi-spectral bulb when you replace a bulb for better, stronger exposures. The article link above shows the difference in the light histogram of multi-spectral bulbs vs. bulbs with far less amplitude in important wavelengths that expose emulsion.



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Equipment (Continued).

• ***How old is the bulb?*** Most un-trained workers don't know. With new workers it may never dawn on them that the bulb has lost its' strength long ago. It still works, lots of white light but very little UV light that creates strong screens. This lamp may work for plastisol prints, but will breakdown with discharge inks. When you replace a bulb write down the date on a label and stick it the side of exposure unit. Change yearly if you have multiple automatics, or semi-annually if you shoot over 50 screens a day.

• ***Exposure Lamp Integrator*** - A lot of shops don't even know their exposure lamp has one. They shoot in seconds and never realize changing to units activates the integrator. On some exposure systems changing from units to seconds requires hitting just one button. New workers have no idea on the difference. ***Units*** measures light in lumens, and ***seconds*** measures time only.

Higher End Tools for Complete Control

We sell the following tools, they can accurately measure the most important parameters of stencil making.

1. Moisture Meter - a great tool to know when a screen is dry. Touching the screen to feel if it is dry doesn't work. It may still be like jello on the inside and dry on the outside. Go ahead shoot it for plastisol, but for waterbase and discharge its the inside that needs to be dry, not just the outside.

Moisture Meter
Measures moisture on the inside of the emulsion coating. The inside of the emulsion must be dry to create predictable, strong screens.

2. Thickness Gauge - Measures the thickness of the mesh first, then the emulsion thickness, and then shows difference between the two.

Emulsion **O**ver **M**esh% Formula:

$$\frac{\text{(Coated Thickness) - (Fabric Thickness)}}{\text{Coated Thickness}} = \textbf{EOM}\%$$

Thickness Gauge
Measures thicknesses of coated screen and raw fabric to determine amount of emulsion over mesh.

If there is no difference, or 0% EOM then the thickness of mesh and emulsion are the same, with the knuckles of the mesh covered with almost no emulsion.

Typically a 110-T's fabric thickness is 134 microns, (found in our catalog in the center pages or on the web at www.murakamiscreen.com). So if we want 7-10% EOM for a strong screen to print discharge we will need the emulsion and fabric to be 143 microns (7%), which is generally achieved with a 1:1 coat using the dull side for Aquasol HV or HVP, a good choice for water base or disharge.

But all scoop coaters are different, as is the speed and pressure the operator uses, how warm or cold the emulsion is, and what type of emulsion. This tool allows for accurate measurements of EOM%. By fine tuning coating procedures, consistent EOM results create consistent predictable exposures and less breakdown on press.

3. Hand Held Microscope with stand - Allows excellent viewing of halftones, emulsion edges, to evaluate the exposure process. Allows skilled employees to show trainees what to look for.

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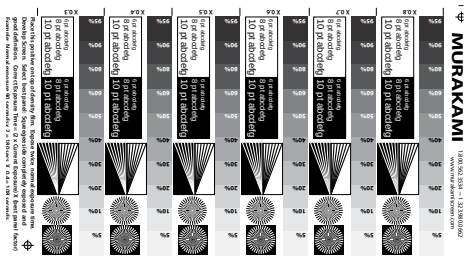
Equipment (Continued).

4. Exposure Calculators or Instructions to run a step test - Here is the link to a previous email on performing a step test.

http://www.murakamiscreen.com/documents/StepTestInstructions.pdf



• Of the two the step test may be better for your shop. Why? Because it uses your film or vellum. A calculator will be very accurate if you use a 5kw lamp and have a D-max in your image of 3.0+. However d-max or opacity of the black image on film varies from shop to shop. Especially if you are using vellum or printing film without a RIP that can control image d-max. So performing a **Step Test** with your film or vellum will give you more accurate exposure results for your shop. A step test also shows the maximum exposure possible and will reveal screen strength/weaknes issues when using vellum and low d-max images.

5. Pressure Washer - A small low PSI pressure washer is the best way to develop a screen. Too often we see shops with a tiny little hose and a stream of water that is, well for lack of a better example, less than my dog's. There is a misconception that a good emulsion should just fall out of the screen and melt. Of the three emulsion types, only diazo exhibits this property. Dual Cures and especially SBQ Pure Photopolymer require more force to wash out. A small inexpensive pressure washer with 600PSI on fan spray is the best tool to develop emulsion. Always develop from the print side, most halftones have just a small amount of emulsion on the squeegee side that keeps them in place.

Optimum Procedures

1. Establish Benchmarks, Calibrate you Shop

What Scoop Coater? Which edge was used? How many coats? Here are some general guidelines for Murakami Emulsions; pressure and speed of scoop coater, mesh tension, and worker technique may affect outcomes, more on that later.

SBQ Pure Photopolymers: 200 mesh and lower.
Dull Side of Scoop Coater
Coat 1 Print Side, 1 Squeegee Side.

SBQ Pure Photopolymers: 200 mesh and higher:
Sharp Side of Scoop Coater
Coat 1 Print Side, 2 Squeegee Side rotating screen 180 degrees between coats.

Dual Cure 200 mesh and lower:
Dull Side of Scoop Coater
Coat 1 Print Side, 2 Squeegee Side rotating screen 180 degrees between coats..

Dual Cure- 200 mesh and higher:
Sharp Side of Scoop Coater
Coat 1 Print Side, 2 Squeegee Side rotating screen 180 degrees between coats.

Diazo - 200 mesh and lower:
Dull Side of Scoop Coater
Coat 1 Print Side, 2 Squeegee Side rotating screen 180 degrees between coats..

Diazo - 200 mesh and higher:
Sharp Side of Scoop Coater
Coat 1 Print Side, 2 Squeegee Side rotating screen 180 degrees between coat

Benchmarks and the procedures to obtain good results also requires employees to adopt them. Techniques need to be emphasized, trained, and inspected until everyone is producing consistent results, otherwise an un-calibrated screen making system will be running the shop.

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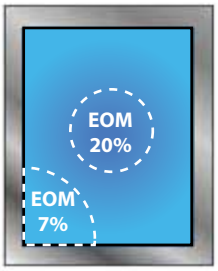
Exposure Procedures:

Coating Screens: Screen Room personnel can develop habits that are hard to break. The most common? Coating too fast with too little pressure. Productivity is emphasiszed in most shops, work harder? Yes. Work faster? Not when you coat screens.

90% of my screen room visits have an employee laying emulsion on as fast as he can. Maybe he has job insecurity and wants to show his boss how fast he works, or its 4:45 and he needs 20 more screens for the morning. So the rush is on. The trouble is the screens will have very thick emulsion coats in the center of the screen which will cause the screen to be underexposed and breakdown on a discharge job along with tons of pinholes from whipping air into the emulsion.



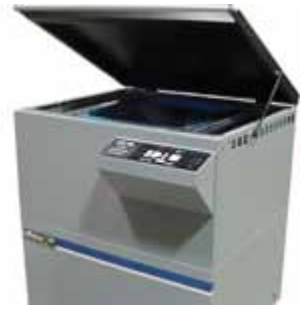
Notice the darker area in the center. This area may be 20-30% EOM and will not expose properly since the exposure time was determined on a 7% EOM screen. This problem is caused by coating too fast or coating low tension screens. Easy to correct, just slow down the coating and use firm pressure against the screen.

The production manager will point out the coating is fine, his plastisol screens aren't breaking down, but this screen with excessive emulsion over mesh in the center can't stand up to discharge because the excessive emulsion results in underexposed emulsion. Plastisol screens can have little emulsion, or too much and be underexposed and still print because plastisol is oil based, it doesn't attack emulsion like discharge or waterbase.

Stencil Thickness is crucial since we use set exposure times or units for different meshes. All have slightly different exposures and to be *accurate exposures* we need *accurate emulsion thickness*. Fast coating does not provide accurate emulsion thicknesses.

Drying Screens: Are your screens dry? Touching them to test dryness doesn't work. Sure the outside skin is dry but the inside is still jello. It takes longer than you would think to dry a screen, especially coarser mesh.

Letting them sit overnight in a dehumidified room before exposing is a good practice to implement. Don't turn the dehumidifier off at night. If you have a hot box set to 80 degrees and a dehumidifier controlling room humidity to 35% with good air movement, 1 hour is a typical minimum drying time. Any shortcuts you take in drying will leave moisture inside the emulsion coating and exposure will be incomplete making a weak screen.



Exposure Procedures:

Once the coating and drying procedure is fine tuned and posted on the wall by the coating station, we can calibrate the exposure times. ***Each mesh count*** needs a step test run to determine proper exposure times. Refer to page 2 for step test links.

Use a tonal ramp from 0-100% for meshes above 150/S. Use paralell art lines 2pt at 22 degrees for mesh below 150/S. Links to files:
url

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Exposure Procedures: (Cont)

If using seconds for exposure time repeat step tests for all mesh counts every three months. If using units you may not need to do this again until you replace the bulb.

Using an integrator set to 'Units' is far superior than using seconds. The exposure unit won't turn off until the screen has received the right amount of light which is measured in lumens. So all screens shot will receive the same amount of light and the same exposure everytime, now who's running the shop?

If the light never goes off it doesn't mean the integrator is broken. The bulb is no longer emitting UV light and the integrator set to units is not receiveing enough light units to turn itself off. Get a new bulb.

Post the coating, drying and exposure settings on the wall for each mesh count. Here is a form you can print out and post to note the important information: url.

Washout: Get a small pressure washer from a home improvement store that can be set to fan spray, (important). Murakami emulsion is strong, it handles the pressure easily.

Wet the screen on both sides or use a dip tank filled with water to soften the emulsion. Wait 2 minutes. Spray the print side of the screen with the fan spray pressure washer at 10-12 inches moving it back and forth over the image. This will quickly develop the screen. If the exposure is complete you can get as close as 4-5 inches and moving the wand back and forth quickly work out fine 4-10% dots or fine line details.

Evaluating Exposure During Washout:

Murakami Emulsion is designed to be completely exposed and hold all the detail in the art. A lot of workers think that underexposing will create better details. This will create premature screen breakdown, rejects, and poor profit margins.

When the screen is wet in development take some white cloth or a paper towel and wipe the inside of the screen in the exposed area, not the image. If there is slime, or emulsion color on the rag the screen is underexposed. With Murakami emulsion it is completely cured when no slime, no color transfer occurs and details are all present. Again a step test can determine the proper expsosure time to determine these conditions. Here are some recommendations on emulsion selections for textile printing.

Aquasol HV or HVP - Plastisol, Waterbase* and Discharge* king. That's a typo, should be **KING.** This emulsion provides the best universal stencil for all textile inks.

Photocure BLU or TXR Very easy to use. Better for printers who only have a fluorescent tube system as it coats a little thinner and exposes better on weaker exposure systems.

Photocure PRO - Excellent for halftone printing in textiles or graphics. Can print waterbase and discharge when hardened*.

SP-1400 - Pure diazo emulsion, longer exposures, but prints Plastisol, Waterbase and Discharge.* Good value, resolution and ease of use.