MURAKAMI SCREEN USA

Technical Newsletter

August 2013

Exposing a Screen vs. Imaging a Screen

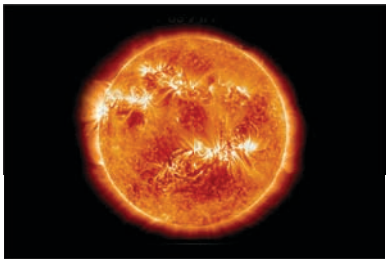
Complete emulsion exposure versus obtaining an image on the screen provides two very different results during production. Let's start at the beginning to see how this difference is often the difference between achieving optimum press performance and struggling to achieve hourly production goals.

Screen exposure is often the most misunderstood area in the screen room. This is simple right? Just expose the screen, dry it, block it out and print it right? First an analogy: Let's say you need to drive 500 miles today to make it to an important sales meeting. Do you just go to the gas station and put 20 dollars in the tank? The car will run, it will travel quite a distance on 20 dollars, but will it make it the full 500 miles? Typically, almost every screen room exposes a screen using the 20 dollar example. Give it enough light to create an image that doesn't wash off in development, dry it, and send it on to production where the production manager expects it to last through a long discharge or high solids acrylic print run. The problem is the production manager is unaware the screen maker never filled up the emulsion 'tank' with enough light to make the entire journey.

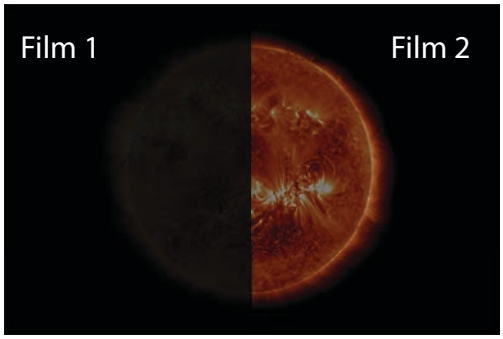
Strong Opaque Film or CTS Imagery allows for maximum exposure times that produce strong screens

Owners will buy brand new screen exposure lamps without considering if the model they choose will expose screens well for ***all ink systems***, then try out every emulsion possible, and yet often suffer through countless screen failures during production. Why? The screen maker simply cuts corners based on past experience that underexposing the emulsion will help develop finer details better. In today's screen printing rooms the variety of artwork that a shop produces can range from solid athletic style art to very detailed index and simulated process prints that test the limits of your screen room and the resolution capabilities of your emulsion.

The art department is prone to try the impossible. While they often see the end results of their work they push the limits of the screen room to get better prints with softer tones, finer details, and well more of what drives the screen room crazy. Film output is robotic; drop the art file in the print queue and go on to another job while film is printed. Ask them what D-max is? "Is that a new band?" could be the reply. Film output should have black dense images with a d-max of 3.0-3.5



Original Image



Film #1 shows little transparency and is very opaque with a Strong 3.0-3.5 D-Max

Film #2 is very transparent with a Weak 1.5-2.0 D-Max

Exposing a Screen vs. Imaging a Screen

The media you use to expose your screens can play an important role in how strong your exposure time can be. Again, completely exposing the emulsion to strong multi spectral light yields the strongest stencils and the d-max of the black area of the image determines how close you can get to achieving strong exposures.

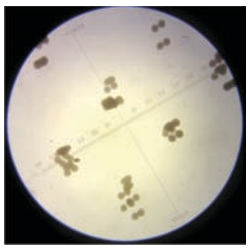
Imaging

1. **Vellum** - This method has the lowest d-max of any image. You can spray with toner enhancers to improve the d-max or you can layer 2 images together, or experiment with the print process to bring up d-max. OK for short plastisol runs by hand. For waterbase and discharge hand printing increasing the d-max, post exposing and blocking out screen with original emulsion is recommended. Not recommended for long automatic press printing.

This area can burn through and expose emulsion.

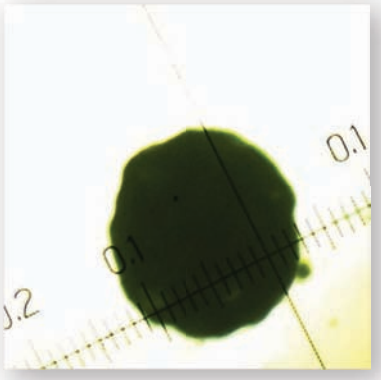
2. **Ink Jet** - Ink Jet d-max can vary significantly depending on type of film used, RIP software used, inks used, printers used and RIP image configuration. This is a subject that deserves an entire newsletter written about it. The goal is to achieve strong d-max with your system using the tools you have. We offer Wasatch RIP and our own JET 5 Ink Jet film to obtain excellent film d-max.

However there is one area that is problematic for inkjet films. The quality of the halftone dot edge is nowhere near the quality of a true image setter. Halftones formed by an ink jet printer are a series of small pico-liter dots and the lower the halftone value the fewer pico-liter dots it uses to create them.



Lower tonal percentages like this 5% tonal on ink jet film can have little d-max and be difficult to image on screen. Art departments need to calibrate their film output for good d-max. Without it the screen room will be forced to underexpose this film to get an image. This habit could also have come from using emulsions that simply cannot resolve fine details without underexposure; Murakami is designed to develop fine details at complete exposure which assures you will also get a durable screen.

3. Image setters - Due to the high cost of film supplies and chemistry they have been replaced by ink jet imaging. Yet the best halftones and edge quality are obtained using an image setter.



This close up of an image setter halftone dot is the same tonal value as the ink jet image in the previous picture at a higher magnification. An image setter's high d-max reading and the well formed halftone dot can allow the emulsion to be completely exposed and still image lower tonal values well.

4. CTS Imaging: Another emerging trend is computer to screen (CTS) imaging that uses no film. There are several types ranging from ink jet imaging, to thermal wax imaging, to direct light exposure using blue laser or LED lamps. The thermal wax system creates a very high d-max image that can be exposed completely without a vacuum blanket. Extra care needs to be taken to prevent the thermal head from touching the mesh threads to extend the life of the print head. CTS imaging with ink jet has many more brands to chose from and is gaining popularity and requires less maintenance than a thermal imaging device. Without the glass and film to weaken light strength, the exposure process can achieve very strong screens on both systems.

Direct light exposure systems have shown remarkable improvements recently but have a substantial price difference from an ink jet CTS device. While the image quality and resolution has improved, the strength of the exposure may still require post exposure and emulsion hardeners for agressive ink systems like discharge and high solids acrylic. This method uses no inks, wax or film consummables.

Underexposure is the beginning of a long downward production spiral of weak screens that will breakdown on press causing more screens to be shot for screen replacement, more emulsion and block out to be purchased, more press labor wasted while waiting for a replacement screen, missed deadlines, more overtime and generally lowering the overall print quality of the shop. Underexposure or Complete exposure?

Result of Underexposed Screens

OR

Well exposed Murakami emulsion that creates durable long lasting stencils with excellent print qualities. A well exposed screen creates profits and prevents you from getting burned!

Underexposing emulsion is the worst fix you can make to get the painstaking hours of artwork to print well and reach hourly production goals. Yet all screen rooms underexpose screens and they pass the problem on to the production manager. Too often the press personnel deal with all of the shortcuts taken in the screen room enduring many interruptions to fix screens. This problem is compounded with agressive ink systems which are becoming required by many major apparel brands and mass merchandisers .

Underexposed screens in production:

Underexposed screens coming from the screen room may look fine; they are blocked out, the image looks good, but at 300 prints using discharge or high solids acrylic inks it breaks down. Press personnel are back in the screen room for a new screen due to the underexposure short cut. A screen is rushed through the screen room, and yet after 300 or less prints it blows out again with other screens close to screen failure as well.

At the end of the day production yields on this press are struggling to break a thousand pieces in eight hours. The screen room manager calls up the emulsion manufacturer to get tech support. I have a list of items to check off with the manager to prevent underexposure and to make their stencils a success. Here is a brief overview:

1. ***What emulsion are you using?*** So I can determine if they are using the right Murakami emulsion for the ink set and suggest one if their current emulsion is failing.

2. ***What exposure unit are you using?*** This helps me determine if the answer to the next question is correct.

3. ***How long are you exposing it for?*** We know the times for 5kw or higher, 1kw, and fluorescent bulbs. But typically two similar units at different shops may have different times due to bulb age which brings up the next question.

4. ***How old is the bulb in your exposure lamp?*** Bulbs age as soon as you start to use them. That's why we recommend using an integrator rather than using time for the exposure. Still at some point age and use will diminish the UV power of the bulb, even though it can ***image*** a screen, it has lost its' ability to ***expose*** a screen well.

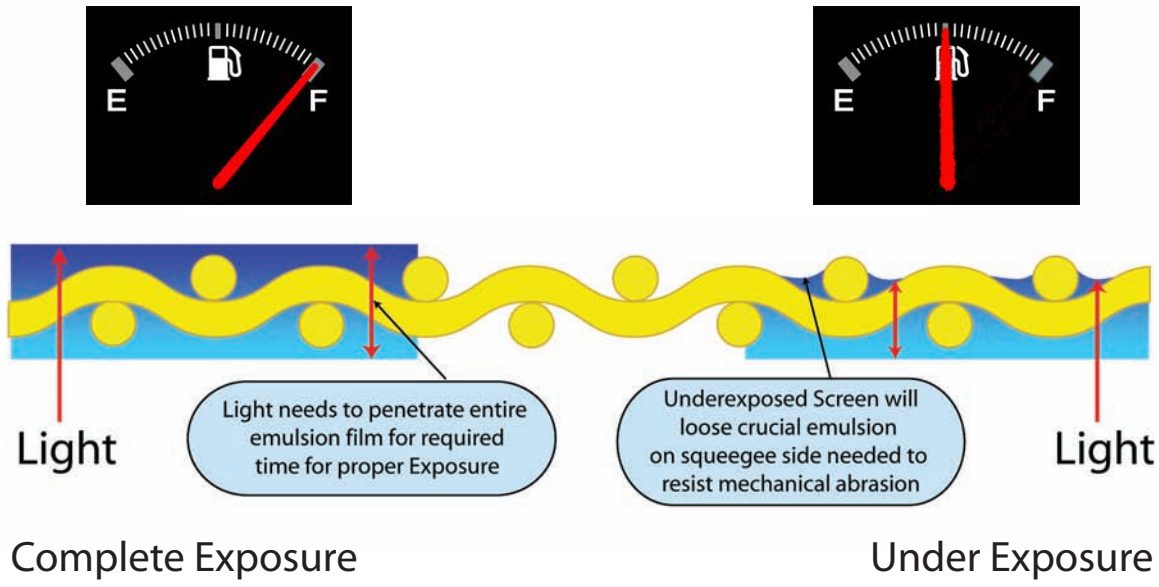
5. ***What are your screen drying conditions? What is the humidity in the screen room, the temperature?*** Humidity is an unseen force that affects your exposure time. Simply put the more ambient humidity in the atmosphere or drying room the longer the exposure will take. Clients in Phoenix with a humidity reading of 5% and 100˚F temperature can expose a pure photopolymer in half the time compared to companies in the tropics or along the ocean where humidity is high due to fog or onshore flow. Humidity slows down the exposure process and if not controlled with dehumidifiers can limit the exposure strength needed to create a strong stencil.

6. ***How do you coat your screens?*** The goal of coating your screens is to achieve consistent emulsion over mesh. Not too much, not too little. Sometimes the underexposure issue is caused by coating too fast and leaving a thick coat in the center of the screen that underexposes and falls off during printing. If more than one person coats screens in your shop they need to mirror each others technique so that emulsion over mesh percentages are consistent.

7. How long do you dry your screens? Too often screens are rushed through the drying process. It may feel dry to the 'touch' but the inside can be the consistency of jello. Controlling the humidity and temperature in the drying area yields predictable drying times. If the screen room has no control over humidity drying times can vary greatly due to weather, lots of reclaimed wet screens, or a nearby pressure washer. De humidifiers solve this.

Image vs. Exposure

Remember the car analogy at the beginning of the newsletter? We need to fill up the screen's "gas tank" with strong light with a complete exposure. Anything less will breakdown on press.



A strong stencil is the easiest fix you can make for your shop. No matter what automatic you own, or plan on buying, a well exposed quality emulsion like Murakami's yields dividends in production. Copy the following link to your browser for an article on running a step test to determine proper exposure time.

http://murakamiscreen.com/wp-content/uploads/2012/07/Step-Test-Instructions.pdf

www.murakamiscreen.com