

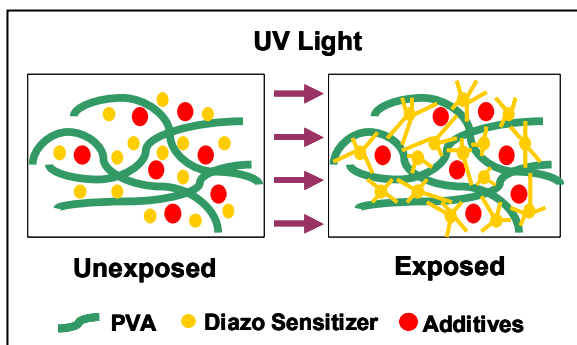
Importance of Maintaining a Low Humidity Screen Making Environment

High humidity is detrimental to the screen making process regardless of the application, but is extremely so when the application involves printing water-base and/or discharge inks. Many garment printers who have long been printing with Plastisol inks are finding out the hard way that water-base and discharge inks require a higher level of control in the screen making process.

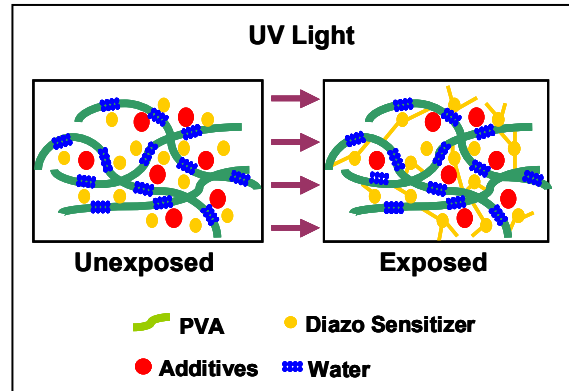
Do you ever find it noticeably more difficult to reclaim some screens than others? Do you notice at times screens pinhole very quickly on press? In production, do your screens (emulsion) become soft and tacky or do they breakdown prematurely? Have you ever experienced a clear film clogging your image area or excessive ghosting after reclaiming? If you answered yes to any of these questions, possibly high humidity was at least partially to blame.

Even though the emulsion feels dry to the touch, residual moisture remains in the coating. When relative humidity exceeds 50%, the level of moisture becomes detrimental. The moisture interferes with the chemical bonding (emulsion curing) process, resulting in weak susceptible stencils.

The image below illustrates the emulsion curing process as it is intended to occur.



This image however, shows how moisture in the emulsion coating impedes the curing process.

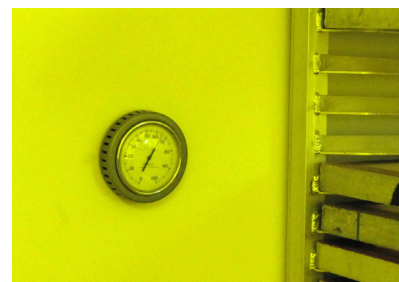


Each illustration shows the chemical structure of emulsion before exposing and after exposing. Notice how the bonding sites between the diazo sensitizer and the polyvinyl alcohol (PVA) are inhibited by the water molecules in the emulsion coating, thus significantly weakening the stencil.

Once coated, screens must be kept in a dry environment continuously until exposed. Between 30-40% relative humidity (RH) is ideal, but 50% RH should never be exceeded. If this occurs, it may result in the following problems:

- Pinholes develop while printing
- Emulsion becomes soft or tacky
- Stencil breaks down prematurely
- Increased reclaiming difficulty
- Ghost/haze images become more prevalent

Using a hygrometer to measure and monitor relative humidity, like the one shown below in a safelight protected screen drying room, is essential in *all* areas where coated screens are handled. Logging this information helps identify trends where humidity tends to spike and cause problems.



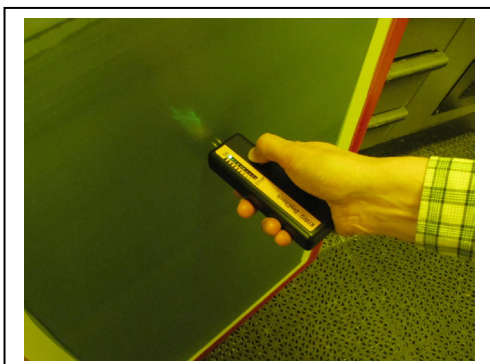


With relative humidity at 65%, the hygrometer shows us this room is not properly controlled.

Simple inexpensive control tools like dehumidifiers, heaters and exhaust fans (shown below) should be used to keep humidity in check and to control the screen production environment year round.



Although a *room* may be dry, screens should not be used until the *emulsion itself* is sufficiently dry. Moisture meters like the ones shown below can be used to help determine when screens are dry enough to be exposed.



Caution! Don't get lulled into a false sense of security. Many well intended screen printers fall into this trap. Many have one beautifully controlled screen drying room but fail to implement humidity controls in every room screens are handled, especially the exposure room. In fact the exposure room is one of the most important areas because it is here that screens either succeed or fail to achieve optimum chemical/water resistance and mechanical durability. This is the make or break point for the screen. Use the moisture meter once again just before exposing to assure screens are still dry. Screens acclimate to ambient conditions so if the humidity is not controlled in *all* screen processing areas, emulsions will re-absorb moisture in the air when moved from dry areas to non dry areas of your shop.

Overlooked areas where humidity is often uncontrolled include screen storage areas, staging or preparation areas, and exposure rooms. Many printers have their washout sink adjacent to the exposure unit – which improves workflow – but often has unintended consequences. Unfortunately, increasing exposure times to compensate for humid environments provides little benefit or no benefit. The little benefit derived is usually attributed to the fact screens were underexposed to begin with.

It is best to isolate your wet and dry processes. For example, don't wheel a rack of wet screens e.g. freshly coated, reclaimed or degreased screens, into an area dry emulsion coated screens are stored, as the emulsion will reabsorb moisture introduced into the area.

All areas of the screen making process must be climate controlled to assure consistency and a controlled process because it is only after screens are thoroughly dried, following exposure and washout, that they become humidity resistant.

This is even more important for printers of water-based and discharge inks. As these inks interact with improperly dried screens, the emulsion softens and swells becoming very tacky to the touch. This is typically the first indication stencil breakdown is beginning to occur.

Under exposed screens react similarly, because the emulsion is not completely cured through its entirety, and since the squeegee side of the screen is the least cured portion of the stencil, it is weak and susceptible.

Since water is the vehicle used to deliver stencil removers more effectively, you can imagine how quickly water based inks can break down a poorly prepared stencil.

With a better understanding of the impact humidity has on the stencil making process, and more importantly on the productivity of your business, I am confident you will choose to implement necessary environmental controls throughout your entire screen making department. The investment to control humidity pales in comparison to the cost of lost productivity caused by not implementing them.

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