

Climate Control



The 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, high humidity was probably at least partially to blame.

Even though emulsion feels dry to the touch, residual moisture remains in the

coating. When relative humidity exceeds 50 percent, the level of moisture becomes detrimental as it interferes with the chemical bonding (emulsion curing) process, resulting in weak, susceptible stencils. Once coated, screens must be kept in a dry environment continuously until exposed. Between 30 and 40 percent relative humidity (RH) is ideal, but when they exceed 50 percent, 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

Tools of the trade

Using a hygrometer to measure and monitor relative humidity is essential in all areas where coated screens are handled. Logging this information helps identify trends

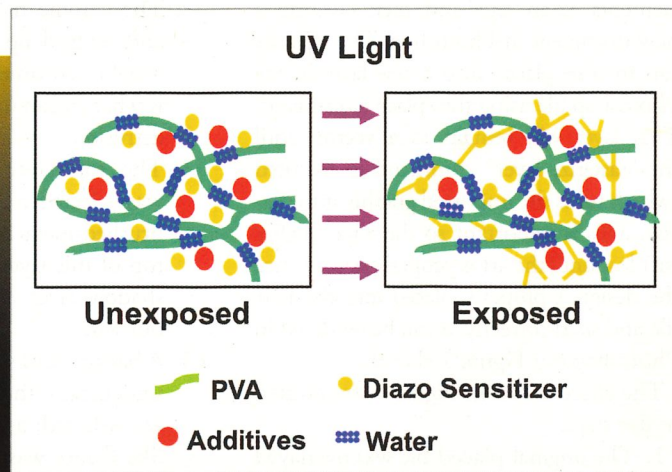
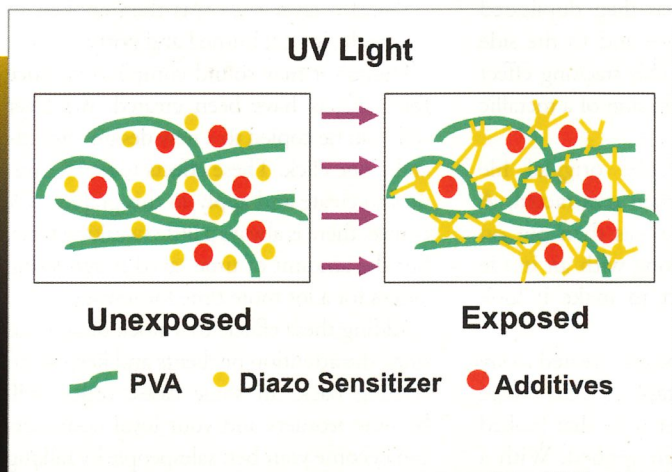
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where humidity tends to spike and cause problems. Simple, inexpensive control tools such as dehumidifiers, heaters and exhaust fans should be used to keep humidity in check and to control the screen-production environment year-round. Although a room may be dry, screens should not be used until the emulsion is sufficiently dry. Moisture meters can 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



The image on the left illustrates the emulsion curing process as it is intended to occur. The image on the right shows how moisture in the emulsion coating impedes the curing process. Each shows the chemical structure of emulsion before 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. (All images courtesy the author)

but fail to implement humidity controls in *every* room where 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.

Comprehensive control

Screens acclimate to ambient conditions. So, if the humidity is not controlled in all screen processing areas, emulsions will reabsorb moisture in the air when moved from dry areas to those in the shop that aren't dry.

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 because this setup improves workflow, but this often has unintended consequences. Unfortunately, increasing exposure times to compensate for humid environments provides little or no benefit. (The little benefit derived is usually attributed to the fact screens were underexposed to begin with.)

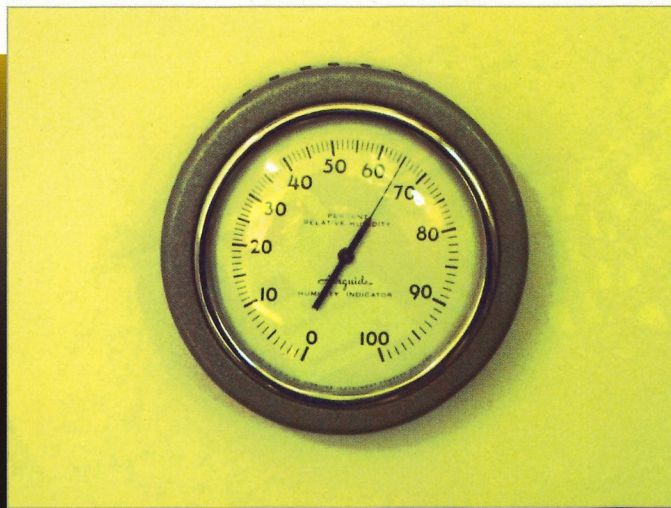
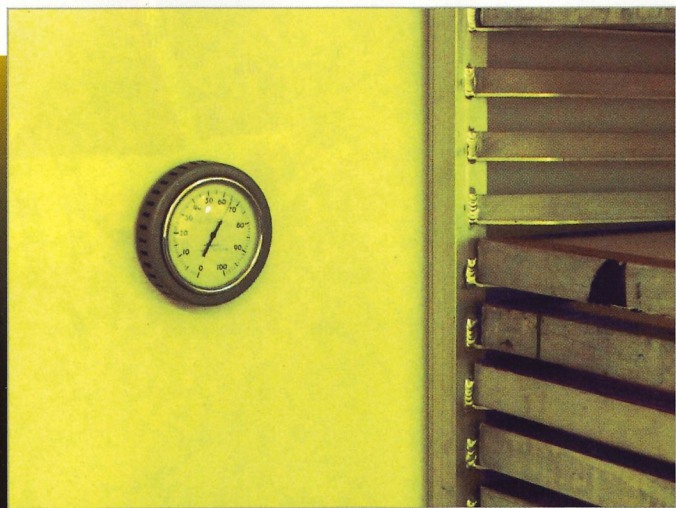
It is best to isolate your wet and dry processes. For example, don't wheel a rack of wet screens (i.e. freshly coated, reclaimed or degreased screens) into an area where dry emulsion-coated screens are stored, as the emulsion will reabsorb moisture introduced into the area.

All areas of the screen-making process must be climate-controlled to assure consistency and a controlled process as it is only after screens are thoroughly dried (following exposure and washout) that they become resistant to humidity. This is even more important for those printing 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 in its entirety and, since the squeegee side of the screen is the least cured portion of the stencil, it is weak and susceptible. Considering that 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, choose to implement necessary environmental controls throughout the entire screen-making department. The investment to control humidity pales in comparison to the cost of lost productivity caused by not implementing them.



Using a hygrometer to measure and monitor relative humidity, shown here in a safelight protected screen drying room, is essential in all areas where coated screens are handled. With relative humidity at 65 percent, the hygrometer shows us this room is not properly controlled.

CLIMATE CONTROL

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Moisture meters can be used to help determine when screens are dry enough to be exposed. Use the moisture meter again just before exposing to assure screens are still dry.