Drying Direct Emulsions

Since liquid emulsions have to be dry before they can be exposed, a certain amount of drying time has to be allowed. How much time? Quite often, not enough!

Drying screens properly is not only more important than most screen printers suspect, but a bit more complicated as well. It's also a critical step that tends to get slighted in the rush to get a screen exposed and onto the press. If your emulsion is not completely dry when you expose it, it simply cannot create a durable stencil.

Water molecules present in the emulsion stop the crosslinking process part way, which means the emulsion never truly becomes hard. This has the unfortunate habit of showing up in the middle of production when the stencil begins to break down. Rushing the drying process may mean having to stop printing later on while you reshoot a replacement screen.

The first thing to understand about drying is that it's a big job. Remember, the solids content of emulsions normally falls between 50% and 30%, so it follows that an emulsion may be as much as 70% water. That's a lot of liquid to get rid of, and since emulsions dry by evaporation, there's only one place for it to go -- into the air.

The rate at which screens dry depends on the ability of the surrounding air to absorb water vapor. The term “relative humidity” describes how much water vapor is present in the air compared to how much it would take to make the air saturated at that particular air temperature. In an enclosed space like a drying room or drying cabinet, the air can soon become saturated. As the space fills with coated screens, the relative humidity (the amount of water vapor present in the air) can soon rise to the point where further absorption becomes impossible. At that point, instead of drying, the emulsion may actually begin reabsorbing water from the surrounding air. This means the air in the room has become saturated and if you are going to get your screens to dry you are going to have to either bring in new, unsaturated air or find a way of making the old air hold more water.

There are a couple of things you can do. The first is to push brand new unsaturated air molecules past the screen. In simple terms: stick a fan in front of it. The fan will provide a continuous stream of unladen air molecules, but it will also pick up any dust in the immediate area and deposit it in the wet emulsion. When you expose the screen every dust particle becomes a tiny positive, keeping the UV light from reaching the emulsion behind it. Consequently that tiny fragment of emulsion never gets hardened and when the screen is washed out you end up with a pinhole where every bit of dust adhered.

While pinholes are not usually considered quite as serious a problem as stencil breakdown, it's well to remember that sometimes pinholes wind up in places where they can't be fixed with a dab of blockout. They might end up smack in the middle of a fine line or cut into the shape of a halftone dot. As the pinhole count mounts up, so does the time require patching them and that soon begins to eat into the bottom line. It can be a tough call deciding to invest the time in trying to rescue a marginal screen or just giving up and reshooting it. Whichever way you go, those pinholes have been just as deadly to your production schedules as any stencil breakdown.

A really dirty drying room can cause not one, but dozens of pinholes in a screen. Every pinhole adds extra time to the prepress process, the press sitting idle while somebody squints at a screen and dabs at pinholes with a blockout-loaded brush. The obvious conclusion is that fans have to be used with caution, and only in an area that is perfectly clean, or you may be slowing things down rather than speeding them up.