

There are several simple things the screen printer can do to ensure that UV ink printing will properly cure. Even before printing begins, we can make several important common sense checks of equipment, ink selection, and instrumentation.

First and foremost, ensure that your curing equipment is functioning properly. Regular equipment maintenance will ensure that your UV reactor is properly focused according to the manufacturer's specifications, that the lamps and reflectors are regularly cleaned, and that the lamps are rotated properly. Replace lamps on the schedule of hours indicated by the manufacturer; do NOT wait until the lamps burn out to replace them! Monitor the actual UV output of your reactor or curing unit with a Digital Radiometer. Several models are available from various manufacturers. Your Sericol Technical Sales Manager or Technical Services Specialist can guide you in selecting a radiometer that will fit your needs. You may discover that you use the radiometer far more often than you might have imagined; many screen printers record a radiometer measurement on the work order for each print job. Sericol's Technical Services Specialists can guide you regarding how much UV is required to cure any particular UV ink series.

Your local Sericol representative can also guide you in selecting the correct ink series for your applications. Naturally, you will want to select an ink that is highly recommended for your particular substrate. Once you have chosen the most appropriate Sericol ink series, you can prepare the ink for printing.

It is essential to thoroughly mix your UV inks properly and fully to ensure that the photo-initiators, flow controls, and additives are evenly distributed throughout the ink. Photo-initiators and other additives are lighter in weight than the heavier resins and pigments, and will tend to migrate to the top of the ink in the container. Simply scrape the lid and thoroughly mix all that amber liquid back into the ink. If this liquid mix is not mixed back in, the top half of the ink in the container will have proportionately more photo-initiators present, and if not mixed back in, that first part of the bucket will be the easiest curing ink you'll ever see! That last half of the container of ink will contain proportionately less photo-initiator and may be more difficult to cure than normal. A strong sign of insufficient mixing is when the first half of the container prints and cures easily and well, while that last half just does not work properly. You will find that many of those mysterious curing problems will disappear when inks are thoroughly mixed before use.

Check the items that control your ink deposit thickness so that the ink film will physically be able to cure. Variables that affect your ink deposit include screen factors such as mesh count, mesh weave, screen tension, and stencil thickness. On press factors include off-contact, and various squeegee and flood-bar characteristics such as profile, sharpness, hardness, angle, pressure, speed, etc.

Do your pre-production testing now, BEFORE you print the whole job! Many printing plants forget to do this quick step before commencing the job. It is a quick, easy, and important part of process control. Once the UV ink has been printed and cured onto the substrate, there are several things you can check. Allow the printed sheet to cool down to room temperature. Then use your nose! If you can detect a strong smell of uncured monomer or ink, then the ink film is probably not fully cured. Some people prefer not to do the smell test, as some uncured monomers may be a bit unpleasant.

Then inspect the printed piece to ensure that there is an even gloss level across the print area. Of course, inks will vary in gloss level, but you are looking for consistency. A dull or wrinkled ink film is normally indicative of under-cure. Do a thumb-twist test by firmly applying pressure with your thumb into the ink film, and then twisting to ensure that the ink does not separate from the surface of the substrate.

The most important test is the “Cross Hatch and Tape” test. This is normally performed using a cross-hatch tool, which is like a glorified hobby knife with a special blade that makes multiple cuts at once, but a regular art knife can be used as well. Make multiple vertical cuts in the print area, then multiple horizontal cuts. There should be at least five cuts in each direction in a “checkered” pattern at least one inch across. The cuts should go through the ink film without cutting through the substrate. Place a piece of strong adhesive tape (such as 3M Scotch 600) across the cut area, burnish it down well, and then rip the tape off. If properly cured and properly adhered onto the correct substrate, the ink will remain on the substrate and not come up on the tape. Curing is usually considered acceptable if not more than 10% of the ink film lifts with the tape. If the job requires several layers of ink to be printed, simply print and test multiple layers. The cross-hatch test is most effective on plastics, and can be somewhat difficult on paper because the paper itself tends to tear and split as the tape is removed.

Keep in mind that all UV curable inks exhibit some degree of post-cure, where they will continue to harden somewhat for several hours after they are out of the UV reactor. Sometimes adhesion that may be marginal right out of the reactor may improve significantly after several hours. It never hurts to run the cross hatch and tape test again later, especially if several layers of ink are to be printed and intercoat adhesion becomes important. Over-cure can present its own set of issues.

Following these simple guidelines and tests will provide you with the best chance of successful curing with UV curable inks. Your Sericol Sales and Technical Services Representatives will gladly provide you with any technical information and guidance you may require.

Ten Steps to Consistent and Repeatable UV Curing

- 1. Check UV curing unit belt speed & radiometer readings.**
- 2. Check Screen Factors, ex. mesh count, tension, stencil thickness.**
- 3. Select the Correct Ink for the substrate, and Thoroughly Mix the UV ink.**
- 4. Check Press Settings, ex. off-contact, squeegee pressure, angle, etc.**
- 5. Print and cure a piece; allow to cool.**
- 6. Smell the ink for odor of under-cure, if appropriate.**
- 7. Check gloss level.**
- 8. Thumb-Twist test.**
- 9. Cross hatch and tape test.**
- 10. Print and cure multiple layers of ink to check intercoat adhesion.**

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