

Overview: In this white paper we will introduce solutions on how to identify and manage the very real problem of dye migration while screen printing on polyester, cotton / polyester blends, tri-blends, and fabrics with a dye-sublimated pattern. Dye migration is usually caused by excessive heat exposure at the flash, cure or post cure level.

Problem: During the screen printing process, the garment is subjected to heat during the flash stages (*a multicolor design could potentially have many flashes during printing*) as well as the cure time in the dryer. The flash process is used to partially cure the ink in between color changes and the dryer cures the finished design after all colors have been printed. Excessive heat can cause residual dye stuffs and or a sublimated pattern to gas off and permeate the ink causing a permanent color change to one or more areas of the design, usually in the lighter logo colors.

Background: Where dye migration has always been a problem, government requirements to reduce the usage of Phthalates, heavy metals and other stabilizing chemicals has forced ink manufacturers to re-engineer plastisol inks and come up with other solutions for blocking dye migration.

How to Test: Before printing, a garment can be tested using a heat press. This process requires the use of a 2" x 2" scrap piece of cotton or embroidery backing and curable reducer. <http://www.education.sanmar.com/multimedia/decoration-tips-experts-dye-migration/>

- Heat your press to 320 °F
- Apply a small amount of curable reducer to the cotton, about the size of a dime.
- Place the garment inside out on the heat press with the lower seam in the middle, place the cotton piece with the curable reducer on the lower seam
- Heat press for 20 sec.
- If the spot of curable reducer pulls away color, you are likely to have dye migration problems.
- Due the variations in fabric and technology it is always best to test a new fabric in a real-world printing process.

Potential Causes of Dye Migration

Ink Selection: Using an ink that is not designed to be printed on polyester or other heat sensitive fabrics is one of the usual suspects. The old way of thinking that we can use regular plastisol on everything is not recommended in today's printing environment.

Solution: Be sure to consult with your ink supplier and choose an ink designed to be used on the fabric being printed. Garments that have polyester usually require a low cure ink with bleed blocking characteristics. These inks generally cure at 290° - 320° with some as low as 250°. The lower the better!

Excessive Heat: Heat can be accumulated in many parts of the printing process and kick start the dye migration. <http://www.education.sanmar.com/multimedia/avoiding-dye-migration/>

Dryer: Be sure to profile your dryer regularly. Most printers use a laser heat gun to read the ink and garment temperatures. Laser heat guns will only get you close and cannot read deep into the chamber. Also remember hot and fast is not the best practice when working with a potential dye migration issue.

Solution: A "Donut Probe" is the best option for profiling your dryer and truly knowing your belt temp, ink temp and identifying hot spots in your dryer.

<https://www.cooper-atkins.com/products/aquatuff-35100-k-screen-print-kit/>

Flash Units: This equipment is one of the most crucial pieces to understand. They produce incredible amount of heat in a very short time and if not controlled can expose the garment to excessive amounts of heat quickly.

Solution: The height of most flash units can be adjusted, be sure to keep your flash unit a reasonable distance from the garment (*this will require testing on your part*) having it too close will over heat the fabric quickly.

Solution: Intensity can and should be adjusted, remember hot and fast is not the best practice when working with a potential dye migration issue. The flash intensity may need to be adjusted throughout your printing process to avoid overheating the garments and most important overheating your pallets. It is a best practice to pre-heat your pallets before starting printing and check them throughout the printing process with a laser heat gun and adjust accordingly. Most manufactures are creating self-adjusting flash units that read the garment temps and adjust automatically. If your running old equipment it may be time to upgrade, consult with your suppliers regularly and visit industry shows to be on top of technology.

Hot Stacking: After printing on polyester, cotton polyester or tri-blends stacking one on top of the other right off the dryer will build up heat and could potentially cause dye migration when everything else was done correct.

Solution: Create a cooling station or stacking area where you can lay out the garments in 3 – 4 stacks. By alternating between stacks 1,2,3,4 you are allowing the garments to cool before another is stacked on top. Many printers also add a fan pointing at the stacks to circulate air.

Solution: Cooling fans at the dryer exit are becoming more popular and start the cooling process while on the dryers unloading belt.

When to use Bleed Blockers:

Base Blockers should always be considered when printing on polyester, cotton polyester blends or tri-blends, when all else fails a bleed blocker base may be required. These come in a few different options.

White Bleed Blocker Base – used when dye migration is minimal.

Gray and Black Bleed Blocker Base – used as dye migration is getting more aggressive.

Posi-Charge Technology:

The easiest way to avoid dye migration is to start with a stable fabric! Preferred by printers, SanMar's Posi-Charge Color Locking Technology provides the most print friendly fabrics in the industry!

The information in this document was gathered from expert contacts throughout the industry and are a part of the Decorator Relations Affiliate Program at SanMar. We strive to bring the best printing fabrics and latest printing technology to the market and work with these companies to test fabrics and the latest in decoration techniques. If you have any questions or would like to learn more about our team, please see the links below.

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