impressions
TECH TIPS
A SPECIAL EDITION OF THE *IMPRESSIONS* NEWSLETTER
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Printing on Polyester Fabrics

Three processes for successful embellishment on these popular garments.

By James Ortolani, Contributing Writer

Step Up Your Game with Gildan®
The Gildan Performance® 46000 Core T-Shirt series is made from snag-resistant 4.7 oz, 100% filament polyester with moisture-wicking and anti-microbial properties to keep you cool, fresh and dry.
Choose from Adult sizes S-4XL, Ladies' sizes XS-2XL and Youth sizes XS-XL in up to 22 shades, including bold Sport colors.

The process for screen printing on T-shirts has fundamentally remained the same for decades because it mostly was done on 50/50 blended and 100% cotton T-shirts. But the introduction of performancewear and moisture-wicking garments has demanded some changes in the screen-print and heat-transfer decorating processes on polyester materials.

To be successful, it's necessary to use the correct screen-printing inks, screens and processes to decorate these new, exciting fabrics. Attempting to print on polyester fabrics using the same approach as that used for printing 100% cotton and 50/50 tees is a recipe for disaster, but following the steps outlined here will make printing on polyester a breeze.

This edition of *Impressions* Tech Tips Newsletter is sponsored by Gildan® and features an in-depth look at three decorating processes on the Gildan Performance® Adult Core T-shirt (style 46000). The Gildan Performance® T-shirts shown in this article were printed at Graphic Solutions Group's (GSG) print lab in Dallas by screen-printing specialist Mark Suhadolnik using modern, state-of-the-art screens, inks and equipment. Special thanks to Jamie Hooper of GSG for his art direction and photography on this project.

GARMENT DESCRIPTION

The Gildan Performance® Adult Core T-shirt is a 4.7-ounce jersey knit polyester fabric that is available in 22 colors. This style also includes specific HiVis colors that are certified as high-visibility background colors.

Other garment features include:
• Active fit with side seam
• Moisture wicking and antimicrobial properties
• Snag resistant
• Tearaway label
• Double-needle sleeve and bottom hem
• Family sizing in adult, ladies and youth sizes

ARTWORK & INKS

The artwork was provided by Great Dane Graphics and output with an Epson T3270 onto roll polyester film. The films were pre-aligned on each screen with the M&R Tri-Loc system, exposed for 9 seconds on the M&R Starlight LED exposure unit and washed out. Good prepress equipment and processes are critical to achieving top-quality prints on polyester.

The screens used were 156 and 230, stretched to 25 N/Cn and coated with KIWO Multi Tex high-solids emulsion and a “one-on-one” coating technique with the scoop coater’s dull side. The screens’ stencil thickness — measured with a stencil-thickness gauge — was 20% EOM. Stencil thickness is critical to ensure that the correct amount of ink is deposited onto the polyester garment’s surface. Stencil thickness is an important factor in controlling the ink deposit’s thickness.

When performance polyester garments were first introduced to the market, screen printers used standard, off-the-shelf plastisol ink to print them. There are two problems with using standard plastisol on 100% polyester.

First, these inks cure at 320˚F, which causes dye migration. These standard inks also do not have the stretch additives found in the new inks formulated for polyester. Fast forward to 2018 and there now are low-cure/high-elongation plastisols available for printing on 100% polyester fabrics. These high-performance plastisols cure in the 275˚F-290˚F range, which is below the point where polyester fabrics begin “gassing” and bleeding through the ink deposit. Note:Always follow your ink manufacturer’s recommended cure-temperature guidelines for the product being used.

For this Tech Tips article, Wilflex Top Score low-cure plastisol inks were used.

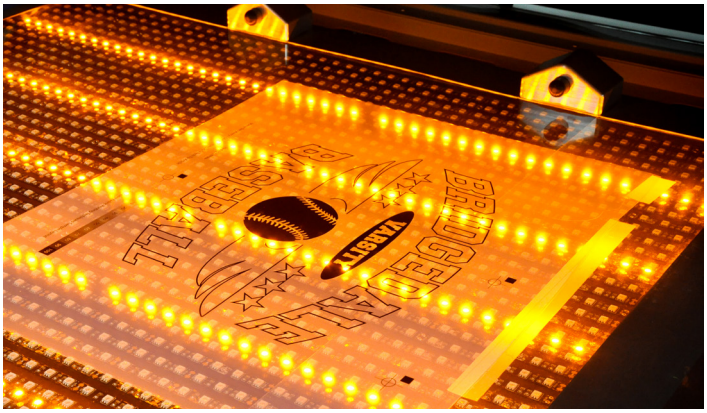
We printed the white Gildan Performance® Adult Core tee wet-on-wet on an M&R eight-color, 10-station Sportsman screen-printing press with 195-mesh screens stretched to 25 N/cn with KIWO photo emulsion and printed with Wilflex Top Score low-cure inks for polyester.

STEP-BY-STEP – Wet-on-Wet Screen-Print Process

STEP 1

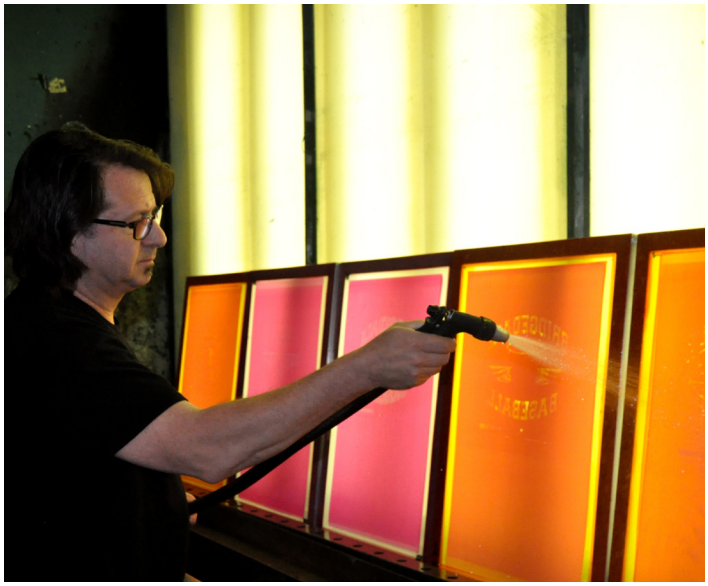
The screens were coated with KIWO Multi-Tex high-solids emulsion and a “one-on-one” coating technique with the scoop coater’s dull side.

STEP-BY-STEP – Wet-on-Wet Screen-Print Process



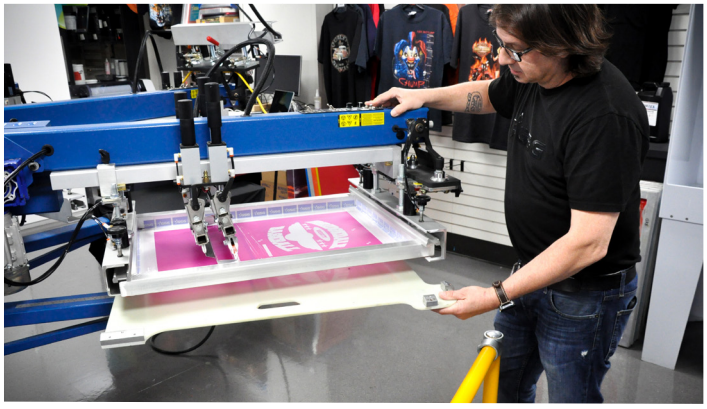
STEP 2

The films were pre-aligned on each screen with the M&R Tri-Loc system, exposed for 9 seconds on the M&R Starlight LED exposure unit and washed out.



STEP 3

Wash out the image on a back-lit washout booth with a water.



STEP 4

Register the four-color print on the M&R Sportsman using the M&R Tri-Loc platen to align all screens.

STEP 5

With the squeegee angle set at 15 degrees on the white performance garments, adjust the squeegee pressure at 40 PSI with medium squeegee speed. Print wet-on-wet without flashing.

STEP 6

Printed wet-on-wet without flashing, and no white underbase. The garments were cured in the M&R Economax D at 290˚F, which is Wilflex Top Score's recommended cure temperature.

PRINTING PROCESS FOR POLYESTER

One approach to printing low-cure/low-bleed plastisol inks on polyester is to print with a 156 mesh, flash and print again (PFP) to achieve good results, depending on the colorfastness of the garment. However, for printing on red or maroon polyester fabrics — which tend to bleed through the ink film — a gray or black underbase is printed first and flashed. The subsequent colors are printed on top of this underbase. For the red 46000 Gildan Performance® T-shirt, the gray bleed-blocker underbase was not necessary. These garments were incredibly easy to print.

The old school of thought was to print polyesters with coarser meshes in the 86-110 range, Although this process works, years of experience have taught us that finer meshes can be selected to print a thinner ink deposit on a polyester surface, which will allow the ink to gel quicker under the flash unit. Less ink deposited also will cure more quickly in the conveyor oven and inks printed through finer mesh counts give the print a softer hand and better drape.

THE PRINTING PRESS

Polyester garments can be printed on a manual or automatic printing press. On-press factors that affect the ink-film thickness include the screen's off-contact distance, squeegee durometer, and squeegee angle, pressure and speed. The eight-color, 10-station M&R Sportsman press used features all the latest upgrades, such as air-lock screen clamps, winged flood bars and Reno-HW flash-cure stations.

It's important to use a thermal "donut" temperature probe to monitor the wet ink-film's temperature prior to printing a polyester-garment production run. The oven temperature was set at 290˚F for the Wilflex Top Score plastisol being used. Overheating low-cure plastisol ink will result in poor bleed resistance.

Here's an example: Print an image onto a swatch of test material with low-cure plastisol ink and press the cross hairs of the donut probe into the wet plastisol while the material is on the conveyor belt.

Next, run the fabric through the entire length of the oven to get an accurate ink-film temperature reading. The donut probe has a long lead wire attached to it to allow the probe to stay with the printed garment as it passes through the dryer. The hand-held thermal device provides a digital readout of the oven temperature.

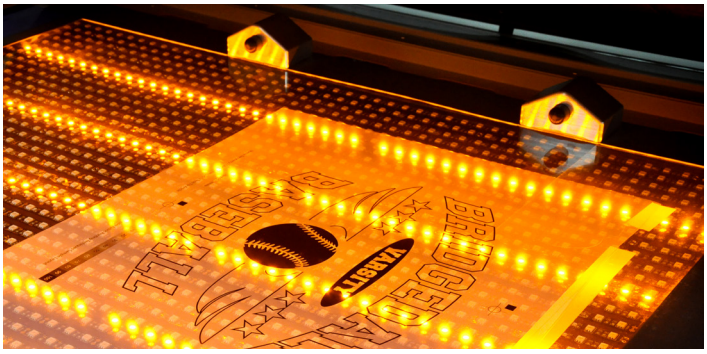
Overheating polyester garments and the low-cure/low-bleed ink also happens during the flash-curing stage, and more attention to detail and substrate temperature is necessary when flashing inks on such fabrics. It is common to heat the shirt-board platens at the beginning of a production run. But it is equally important to dial back the heat panel temperature of the flash until you get a substrate reading of 190˚F-220˚F. A handheld infrared ray gun works well for measuring surface substrate temperatures when flashing.

STEP-BY-STEP – Printing 46000 Red Gildan Performance® T-Shirt

STEP 1

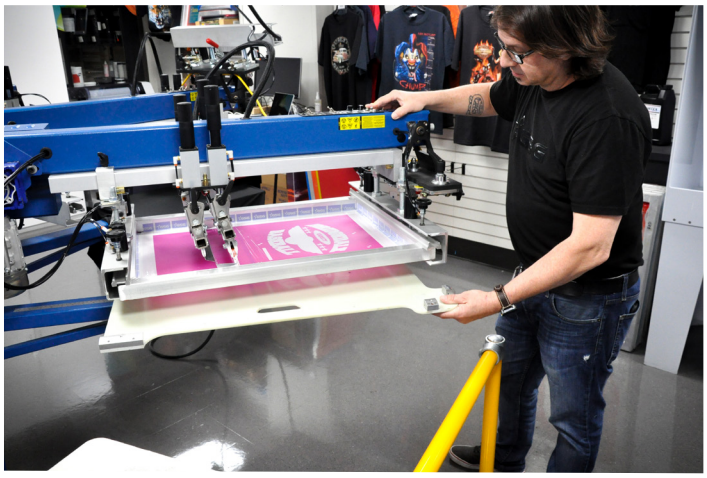
The screens were coated with KIWO Multi-Tex high-solids emulsion and a "one-on-one" coating technique with the scoop coater's dull side.

STEP-BY-STEP – Printing 46000 Red Gildan Performance® T-Shirt



STEP 2

Film positives line up with the M&R Tri-Loc system exposing the extra screen for the white underbase. An extra screen was exposed for the white underbase on the red garment.



STEP 4

Register the four-color print and set up the flash-cure station.

STEP 5

With the squeegee angle set at 15 degrees on the red performance garments, adjust the squeegee pressure at 45 PSI on the white underbase with the squeegee durometer of 60/90/60 and the top colors at 40 PSI with a 70-durometer with medium squeegee speed.

STEP 3

Wash out the screens in a back-lit screen-washout booth with a water-pressure sprayer.

STEP 6

Print the white underbase and flash at a temperature between 190˚F and 220˚F, then print subsequent colors wet-on-wet on the white underbase. The printed garment was cured in the M&R Economax D.

TIPS FOR HEAT TRANSFERS ON POLYESTER

That old, faithful heat press that has worked in the shop for generations on standard cotton T-shirts and 50/50 blends needs to be upgraded with a new, state-of-the-art heat press equipped with a modern digital temperature controller and pressure readout. Old heat presses are the No. 1 reason garment decorators have issues when decorating polyester performancewear. The old press you have had for decades has paid for itself, so give it a rest.

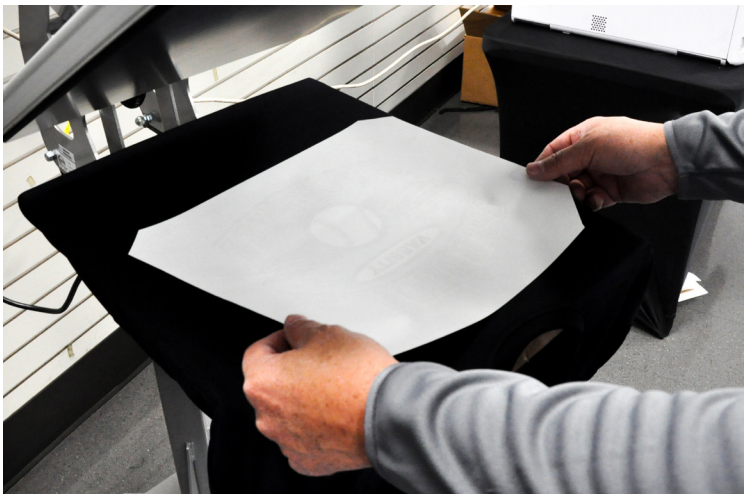
Many modern heat presses also are equipped with a lower platen that allows the garment to be split or "threaded" over the lower platen, which is ideal for heat transferring onto polyester garments.

Special heat transfers are available for decorating polyester fabrics. For this Tech Tips article, Stahls' Elasti Prints — made for decorating polyester and performancewear — were used. Elasti Prints are heat-applied at a low temperature of 300˚F for 15 seconds with medium pressure, with a 6 or 7 on the digital pressure read out. A Stahls' Hotronix heat press, courtesy of GSG Dallas, was used.

STEP-BY-STEP – Heat Transferring on the Black 46000 Gildan® Performance Tee.

STEP 1 Split or "thread" the garment over the lower platen.

STEP 2 Pre-press the garment for 3-5 seconds.



STEP 3 Position the transfer ink side down on the garment.

STEP-BY-STEP – Heat Transferring on the Black 46000 Gildan® Performance Tee.

STEP 4

Press the heat transfer for 15 seconds

STEP 5

Release the heat platen and allow the transfer to cool. After the paper is cool, peel it in a smooth, even motion and discard.

STEP 6

The finished print.

James Ortolani *has more than 30 years of experience in the decorated apparel industry, specializing in hands-on direct screen printing and heat-transfer production. He currently works for PolyOne Corp. For more information or to comment on this article, email James at* **james.ortolani@polyone.com.**