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TECHNICAL FOCUS

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Textile/ T-shirt pre-press and printing challenges and solutions

The objective of textile screen printing has always been to duplicate an artists' conception on roll to roll fabric, cut pieces of fabric or T-shirts. The screen printing art department has to decide how it separates individual colors to duplicate the art on fabric. To achieve this, many variables have been introduced to the process. We all wish there was a ***Holy Grail*** of screen printing to easily print a perfect shirt every time, but unfortunately there is no such thing. The best way to insure consistent quality and repeatability is to reduce or eliminate as many variables as possible.

The quality of mesh has had vast improvements throughout recent past years. Most mesh used today is **high tension low elongation mesh** allowing it to maintain the proper tension longer. The screen, itself, is a wood, metal or roller frame with polyester mesh stretched over it. It is then coated with film or emulsion to make a stencil to print ink through the mesh. As market demands have changed so have mesh count requirements. There is a whole array of mesh counts used to duplicate the art. Sometimes these requirements call for very thick deposits of ink on the fabric. Depending on the effect to be printed on the shirt a specific mesh count is chosen and may require multiple passes with the squeegee to adequately cover the fabric with ink. Because this process requires more time it can reduce the profitability of a job.

Printing with180/inch, 48 micron, S-thread

Discharge printing on Black shirts, using 150/inch, 48 micron, S-thread

With new demands we have experienced an immense number of changes including many special effects over the last ten years. Rather than reducing variables we have increased them.

Garment printing in 2009 is going through a new transition where the buyers & market demands are requiring a softer hand print and, in some cases, new environmentally compliant inks must be used. Water base inks, discharge, PVC free inks and phthalate free inks are becoming common place. These new inks require different emulsions to allow the stencil to hold up throughout the print

"Once again, this cuts into the profitability and desirability of the print because of the new soft hand demand."

run. It also requires a new type of mesh to help insure the print quality and consistent results for these new special effects demands.

Over the years mesh manufactures have increased the number of mesh counts and thread diameters to meet the industry's needs. Mesh was chosen for its durability and ability to be stretched to high tension. A standard for thread thickness was achieved and the designations became: S for thinner thread diameter, T or M for medium thread diameter and HD for thicker thread-diameter. T-threads have become the industry standard for most mesh counts used today. The typical mesh counts used today are 60, 86, 110, 125, 156, 195, 230, 305 and some 355 for higher detail.

With the influx of pre-stretched screens being used today very little attention is given to the thread diameter. Many times a mesh count is chosen not for its ability to allow an easy transfer of ink but because they are the mesh counts that have always been used before. This scenario creates the need for multiple passes with the squeegee to achieve the proper ink coverage on the fabric. Because of these extra passes we can end up with more than the desired amount of ink on the shirt. Once again, this cuts into the profitability and desirability of the print because of the new soft hand demand.

Murakami's New Direction

It is time to re-think how you look at mesh!
Unfortunately, not enough attention has been given to Murakami's S-threads and thread thickness in general. It is very important to consider the thread diameter, the open area, the fabric thickness and the ink volume when selecting the proper mesh count for a specific job. The S-thread open area allows more ink to easily pass through the mesh and the thread thickness decreases the thickness of ink deposited on the fabric.

This will eliminate the need for high squeegee pressure and multiple squeegee passes to adequately cover the fabric with ink. Reducing the flood bar and squeegee pressure will also lengthen the life of the mesh and screen itself. Thinner more opaque coverage becomes very important for base plate prints where soft hand printing is required.

Printed with 180/inch, 48 micron, S-thread

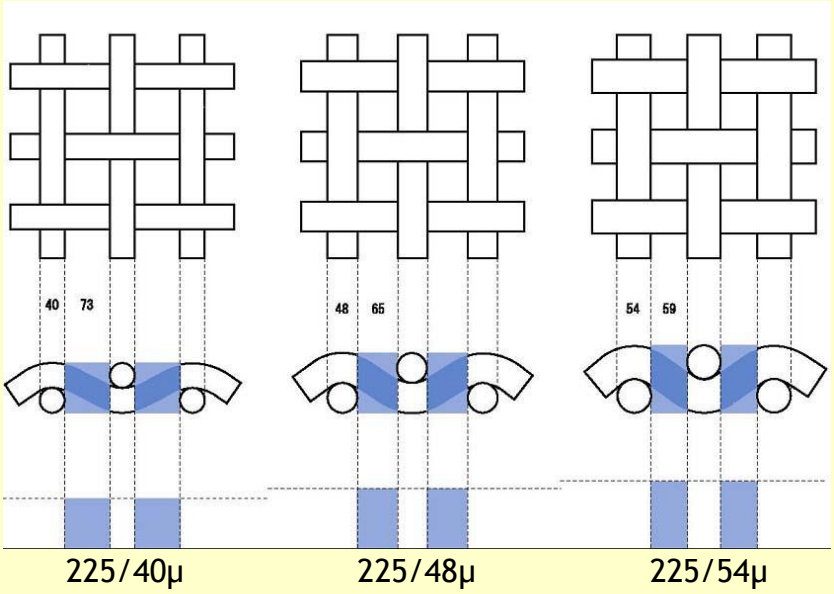
When S-thread is properly stretched it only has to be stretched to approximately 28N/cm. The screen printing art department has to evaluate the artist's conception and decide how the art has to be separated into individual colors to duplicate the art on the shirt with a softer hand.

This tension achieves excellent snap off of the shirt and will require less off contact. Nittoku's high quality standards insure that you will have the same results from screen to screen. Consistent quality and repeatability certainly puts us on a path to begin reducing variables, increasing profits, and satisfied customers.

Over the last few years Murakami and Nittoku have made many vital improvements to the threads and emulsions used in the screen printing industry. Because of these improvements the number of mesh counts used can be reduced. In most cases using only four S-thread mesh counts will adequately cover the whole spectrum of printing done today. Because we can replace lower mesh counts with higher mesh counts, finer detail can be resolved on the stencil.

All of us at Murakami will be pleased to work with you to make the transition to S-threads. We will be happy to inform you of the procedural changes and supply you with the appropriate mesh to get started. The following technical article will show examples of the printing results you can achieve.

TEXTILE PRINTING WITH THIN THREADS



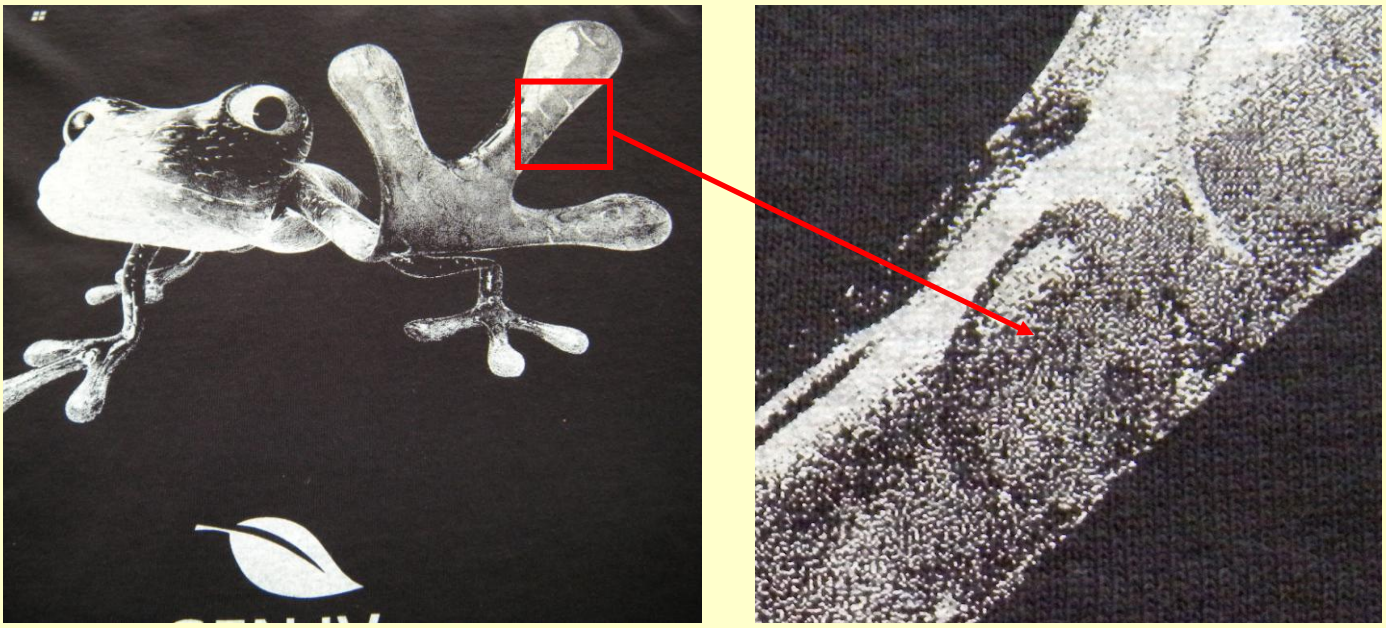
Relationship between Thread Diameter and Ink

"It is amazing what you can accomplish when less is actually more,"

Printed with 330/inch, 30 micron, S-thread

The graphs above demonstrate the difference between S-threads and standard or T-threads. The thinner threads provide a larger mesh opening and thinner thread thickness. This unique combination allows garment printers to get more out of less. In other words, we get a more opaque deposit and finer detail with less ink.

Printing with thin thread technology is not a difficult proposition for textile printers. Once you see and understand the dynamics of what is actually happening, you too will be anxious to try Murakami's "S" Thread Technology. It is amazing what you can accomplish when less is actually more, because thinner threads allow ink to flow more easily through the mesh with lower squeegee and flood bar pressure. This is accomplished because the thread diameter is thinner, the mesh opening in larger, and the thread thickness (crimp) is also thinner. You will use less ink with better coverage and faster press speeds.



White Base Plate 150S/inch, 48micron, S-thread, Print One Pass on an M&R Press

This is something we can discuss for light years, however, after printing with S-thread you will see what we are saying. "Printing & Seeing Is Believing"

Murakami's investigation into the use of 135S instead of 110T for Plastisol white, 150S instead of 160T or 180T for base plates and 225S for water based inks and simulated process has shown to be a much more effective way to achieve opacity, detail, and a softer hand. The thinner threads deliver a much softer hand to the printed garment because S-threads allow superior ink flow without driving the ink through the garment. The S- thread allows you to print without very high squeegee pressure which mashes and distorts the image. I.e. the print has a more controlled ink film layer on top of the garment where it belongs.

Achieving a bright white base plate does not mean that an abundance of ink needs to be printed. Let's look at it as if we were frosting a cake. A layer of frosting goes on top of the cake not into it. The same is true for white base

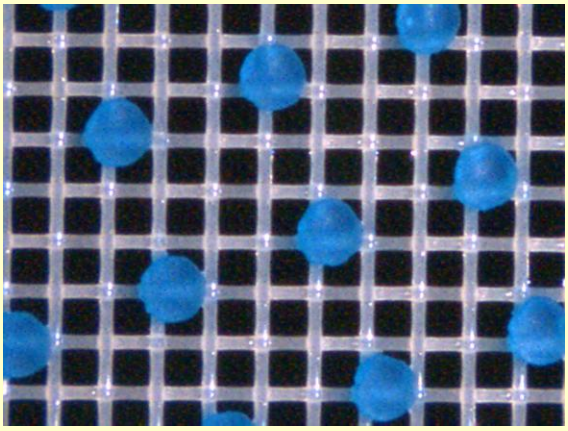
The ink layer needs to be on top of the shirt, not completely through it. This is easily done by using our 150S Smart Mesh to print the base plate. We achieve a more opaque white print with less ink going down onto the garment. Imagine a more brilliant white with less ink lay down, a better hand to the garment, less fibrillation of garment fibers, and more vivid colors from the inks that are printed on top of the base plate. The same set of rules applies to a white touch plate.

You can easily see that the opacity and detail through 150S Murakami Smart Mesh is fantastic for a one hit white base plate.

Adjustments to flood bar pressure, squeegee pressure, squeegee speed, and press speed also need to be addressed. Tension levels in the mid 20's are sufficient for printing with S-threads. There is no need to over tension your screens. The print above was done on a Newman Roller Frame with a Smart Mesh 150/48S panel (23 x 31) tensioned to 24 Newton. **You will achieve a great print with longer screen life!**

Spot colors and discharge may be printed through 150S, 160S, or 180S. Water based inks, discharge, process colors, and simulated process may be printed through 225S. Murakami has done the testing and will guide you through your initial evaluation and eventual switch to the correct S-thread mesh counts.

Thinner threads also give us the opportunity to hold and print finer copy. This occurs because the thinner threads tend to not block ink from flowing through finer images.



135/inch, 48 micron, S-thread

The photo above is Murakami Smart Mesh 135S with a 48 micron thread diameter. Each dot is securely adhered to the mesh with enough open area to allow ink to flow easily through the mesh with a minimum amount of squeegee and flood bar pressure. This allows for color opacity and the ability to hold and print finer detail. We are not suggesting that halftone printing should be done through 135S. This is more of an object lesson. Obviously, depending on the halftone number you will need a finer mesh count to capture/resolve the dots.

"Color opacity, the ability to hold and print finer detail"

Both shirts printed with 330/inch, 30 micron, S-thread

Printing Discharge Inks with S-Thread

When discharge inks are used S-thread has significant advantages. First discharge ink is prone to dry in the mesh if left unattended or during long production runs. S-thread helps prevent discharge ink from drying in the screen by having a larger open mesh area. When a press is restarted after a repair the S-thread screens will clear and self-clean avoiding the need to stop the press to wash a screen that has dried in.

Often just printing some test shirts with multiple hits will open the screen without need for a complete screen wash. This helps prevent ghosting on production shirts that can occur after a screen is washed with water leaving

residual discharge material along tape edges causing ghost lines or faint bleached out areas around the image.

S-thread also produces more vibrant discharge prints since it soaks the shirt with ink better. Good discharge prints need the ink to penetrate the shirt at least half way through the fabric thickness. Shirts are like a sponge and will soak up discharge ink better through S-thread producing a stronger discharge effect and more vibrant color. The S-thread properties previously discussed all help discharge screens as well. Less squeegee pressure will help prevent the stencil from breakdown, squeegee speeds can be returned to normal speeds and still soak the fabric which improves production yields, and higher mesh counts can be used to produce more detailed discharge prints utilizing halftones and finer details. S-thread combined with Murakami's AQUASOL-HVP represents the pinnacle of discharge and water base printing in the industry today.

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- *After reading this report we hope that it has peaked your interest and that you agree with the following: reducing the number of mesh counts you use, printing opaque base plates with a soft hand, brilliant colors on top of the base plates, low density discharge prints, less ink used per job, one hit whites, faster press speeds, longer mesh life, consistent printing from job to job, and reducing costly variables is something you would like to aspire to.*

Please contact us and make an appointment for Bob, Alan, Walt or one of the highly qualified Murakami dealers to come into your shop and get you started with a new way to print on fabric.

MURAKAMI TOLL FREE: 800-562-3534