



While fabrics may look the same, the quality can differ among suppliers. This canvas is 100% cotton, pigment-printed on a Kornit machine.

Why Fabric Matters

Finding the Right Fit of Fabric and Technology



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All images courtesy of TVF.

Why does fabric matter? It might seem like a simple question, but it's an important one. Having the right fabric for a project can be the difference between success and failure. An image may look great, but if the fabric does not hold up and perform properly, the project will fail. There are so many elements that contribute to successful digital textile printing whether the project is for the apparel, home décor, or signage markets.

It's critical to factor in fabric construction and determine if a knit, warp knit, or woven fabric is right for the project; this will be the key to application success. It will also impact price — it's important to remember the adage, "you get what you pay for." When talking to a fabric vendor, it's imperative to discuss construction and quality. Before considering the specific jobs within different markets, it's helpful to review the machinery and print technologies needed for each area of the printing industry.

Identifying Processes for Applications

Dye-sublimation, undoubtedly, is the biggest segment in digital printing and can be used for signage, home décor, and apparel products. This is a method of printing polyester fabric with disperse dyes, in which the designs are printed on paper and transferred onto the fabric using heat via a calender or heat press. Because the dyes are gassed onto the fabric, the result is excellent penetration into the fibers and extremely sharp images. Machines come in a variety of sizes, widths, and price points; volume and project needs will determine the best fit for one's business.

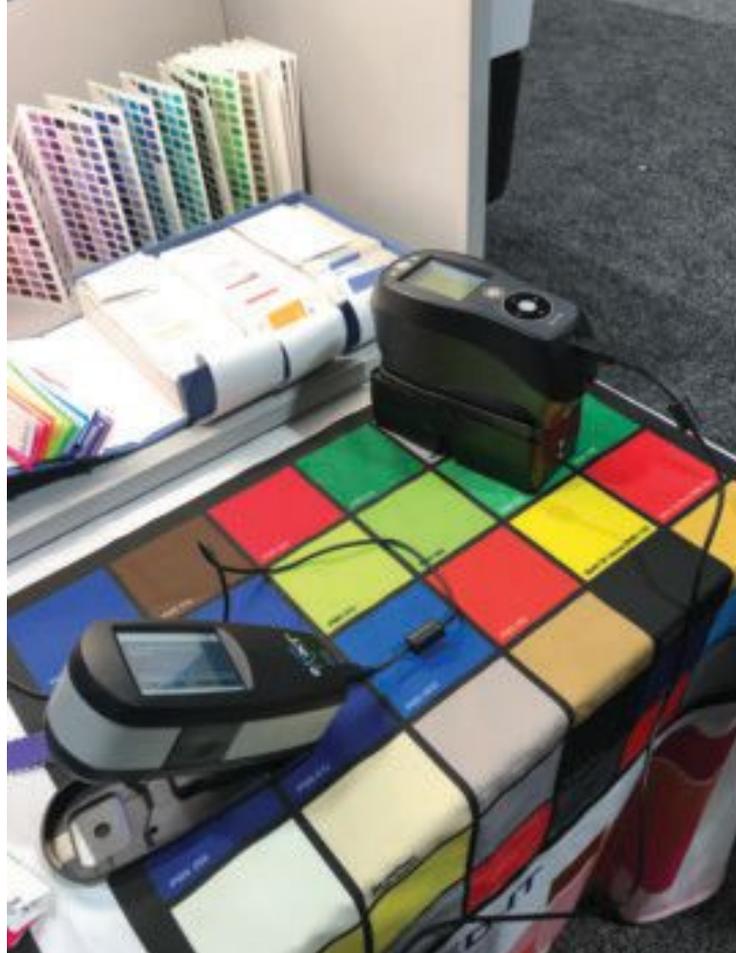
Direct disperse is another method of printing polyester fabric using disperse dye. This is mainly used with projects requiring higher saturation of dyes, including signage, banners, silicone edge graphic (SEG) frame systems, and flags. With the direct-disperse system, disperse coating is applied directly to the fabric when it is being produced

and finished. Because no paper is needed, it can be very cost effective and better for the environment. Combo machines allow printers to utilize both direct-disperse and dye-sublimation technologies, however, dye-sublimation will result in better clarity and detail and should be the method of choice if the product is going to be seen up close.

Pigment printing is probably the holy grail of digital printing. Most printing done on rotary or flatbed machines is produced with pigments. Pigments are not dyes — they are made up of a colorant with a binder, with the binder acting as a glue to hold the pigment onto the fabric. Pigment printing's advantages are that it can go onto any substrate and any blend of fabric, and it has outstanding color repeatability.

Pigments also boast excellent lightfastness. The main struggles with this type of digital printing are crockfastness and washfastness, with the biggest challenge being getting enough binder through the printheads. This is due to the larger size molecules within the binder. To combat these issues, fabric may require a pretreatment prior to printing. Luckily, new technologies are being developed that overcome

A machine weaves cotton broadcloth two-up. Discussing fabric construction is crucial when working with suppliers.



Every partnership in the digital textile process is important, including the spectrophotometers used for color management.

this issue, and there are many different platforms already available. It should be noted that latex is actually a form of pigment printing. UV printing is another type of pigment, however, instead of a binder, the ink is cured with UV light. This is used not only for fabrics, but for many other substrates.

Finally, reactive dyes are used for cottons and other cellulosic fibers, and acid dyes are used for nylon and silks. These require special coatings, as well as washing and steaming the

fabric after it's printed. The necessary additional equipment precludes most companies from using these methods. (Repeatability is also an issue.)

Not All Fabrics Are Created Equal

Now that there is a basic understanding of the machines, processes, and technology involved, it's time to move on to the fabrics.

In the apparel market, it is possible to use a 6.5-oz cotton jersey to make a T-shirt; however, not all 6.5-oz cotton jerseys are the same. A cotton jersey made from open-end yarn will perform much differently compared to a cotton jersey made from Supima cotton, and ultimately, the T-shirts will have completely different lifespans. The open-end cotton will begin to pill the first time it's laundered and will become hairy with increased pilling after about 10 washings, while the Supima cotton T-shirt will last for years. Both are 6.5-oz cotton jerseys, but the quality, wearability, and pricing are completely different. (Pricing may double or even triple in cost, depending on yarns and construction.) Analyzing quality is important for all types of fabrics whether it's

FEATURE

cotton, polyester, or blends.

In the home décor market, different weaves can impact the quality and longevity of bedding fabrics, as well as make a tremendous difference in performance. When comparing a square weave to a sateen weave, for example, the latter will outperform every time. Thread count is another factor that must be considered. A bed sheet may be made out of a 60x60 (120-thread-count) sheeting using 30 single threads, or it can be made from a 380x420 (800-thread-count) satin weave using 100 single threads. The 120-count sheet will last about a year while the 800-count sheet can last for a lifetime.

In the signage market, a warp knit is normally the best construction to use because it has a locking stitch that won't tear. Warp knits also have increased dimensional stability compared to wovens, while circular knits won't work at all. There are some wovens on the market that will work for signage, however, warp knits will outperform wovens 99% of the time. Warp knits also typically

A warp knitting machine at Georg+Otto Friedrich in Germany. A warp knit is normally the best construction to use for signage because it has a locking stitch that won't tear.

Courtesy of TVF/Georg+Otto Friedrich.



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achieve a much crisper print quality. Coatings are also an important factor and can significantly impact clarity, migration, color-to-lightfastness, and crocking. Again, “you get what you pay for” holds true.

There are many factors to consider when sourcing fabrics for digital textile printing, and the smallest variables can significantly impact the outcome of the project.

Understanding Constructions

It's crucial to be specific about fabric construction when discussing fabric with suppliers, whether it's a woven, warp knit, or knit. Yarn count — how many yarns are visible per square inch of fabric — is also important. This can be calculated by using a pick glass to count the number of yarns in each direction — warp and weft. For instance, a broadcloth construction can be 132x72, which is a 204 count using 40 singles of combed ring-spun cotton.

Yarn sizes typically range from 10 to 80 singles; the smaller the yarn number, the bigger the yarn. Thus, 80 singles is a very fine yarn. Typically, yarn sizes that are 40 singles and above are wet spun. This creates a much higher quality substrate. This does not mean that a 20-singles fabric is bad, however, the yarn would likely be made into a heavy duck or canvas.

When it comes to yarn quality, cottons and polyesters use different terminology. For cottons, descriptors such as open-end, combed, combed ring-spun, and Supima, are used. For polyesters, filament size, textured or non-textured, dull, semi-dull,

Suppliers should have a high level of quality control, checking for all specifications, including testing fabrics for shrinkage in length, width, and torque.



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shiny, or spun polyester can be used.

There are numerous factors to consider with fabrics and each of them are important in different ways. Ultimately, fabrics may look the same, but they are not; the “same” fabric from different suppliers may not be the same quality. The rule of thumb is to get a good fabric supplier to analyze any fabric and provide a spec sheet. If the supplier can’t or won’t supply detailed information about the fabric, a new fabric partner is needed.

Thorough fabric analysis requires a full width sample of a quarter-yard cut from selvage to selvage. (At a minimum, a 6x7” sample would work). In the case of garment replacement, the textile expert who is doing the analysis must cut the fabric. The fabric analysis process with a trusted supplier should ensure confidence that the right fabric will be found. After analysis, it is quite common that the customer finds out their fabric has a completely different construction from what was originally described. It’s important for people to investigate thoroughly and ensure they are getting the right fabrics for their needs.

Pay Attention to Shrinkage

One of the most overlooked aspects of fabric digital printers need to consider is shrinkage. Shrinkage is determined by measuring the fabric in width, length, and torque after laundering. This is done by marking the fabric with permanent ink and following wash instructions exactly (similar to what is found on a care tag).



Pigments being tested for crocking using the American Association of Textile Chemists and Colorists method. Crockfastness and washfastness are the main struggles with pigment printing.



Home décor, hospitality, and signage projects require fire repellent (FR) certifications for flammability, among other testing requirements. This Yellowstone fabric is constructed with flame-retardant yarn.

It’s important that fabric is sourced from a supplier that provides consistency and has a high level of quality control, checking the weight, shrinkage, printability, and all fabric specifications. If the fabric changes in any way, a new shrinkage test must be done. Otherwise, the fabric will not fit into the SEG, banner teardrop, etc., after printing. Of course, the larger the project, the more distortion is expected.

In the apparel industry, the rule of thumb is for every 5% change, there will be a one size difference. It’s also good to know that most of the time the shrinkage occurs in the length. To avoid being stretched, the fewest tension bars should be used when fabric is pulled through the printer. (Tension bars are there to help prevent wrinkles.) Tension can create problems,

and fabric torquing (twisting or rotating) is a big issue as well. One example of torquing is a pant seam that moves from the side to the front or back of the garment after it’s washed. Torquing can also happen in signage projects, especially with twill weaves for SEG applications. The twill fabric will likely move even after installation. While a twill weave is great for a pair of Levi’s, it’s not the best option for SEG due to the construction. Twill signage fabrics can also make an image look pixelated and are not recommended.

Shrinkage should be built into the fabric profile. Some fabrics may have higher shrinkage due to the material content and construction. In summary, sourcing preshrunk, consistent fabric is vital to ensure the workflow runs smoothly in the apparel, home décor, or signage markets.

The Importance of Testing

Another key to success lies in textile testing. The textile supplier must recognize all required testing

for each digital printing market segment, whether signage, apparel, or home décor. Every market segment adheres to different test methods and it's crucial to understand each one.

When it comes to apparel, color-to-washfastness testing is extremely important, however, it may be unnecessary for upholstery or signage projects. This is because people do not wash couches and signs. In contrast, in the home décor market, upholstery fabrics should be abrasion tested with the Wyzenbeek method. Home décor, hospitality, and signage projects will also require fire repellent (FR) certifications for flammability (NFPA260, UFC A, CATB117-2013, and NFPA701-1). In fact, FR certifications will need to be on-hand for trade show, hotel, restaurant, and other commercial projects. All textile testing methods are regulated by the American Association of Textile Chemists and Colorists, and can be found in the organization's technical manual.

Additional Supplier/Fabric Sourcing Considerations

It's critical to partner with a fabric supplier that is trustworthy and

For bike jerseys and other athleisure applications, an interlock fabric that offers mechanical strength in the width and moisture management is ideal.



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will look out for their customers. The fabric supplier is only as good as their customers' success. If one part of the partnership fails, the entire team fails, and it's crucial that reliable and knowledgeable people make up the supply chain. In digital textile printing, it's also necessary to have the right machinery partner to support and service the printer. Additionally, having the right profiles and profiling equipment is a must. Simply looking for short-term assistance will be detrimental in the end; building long-term partnerships that can evolve with the technology will make a tremendous difference.

Specifically, in textile partnerships, it's important to note that not every supplier will have the right fabric for all needs. People need to have an open mind and continue to learn about fabrics. Many mills are specialized, so partnering with a supplier who offers variety might be necessary. Again, the key is developing a relationship with a textile supplier who can spec out fabric and provide shrinkage percentages and testing certifications. If the supplier can't deliver this information,

changing suppliers might be necessary.

Over the past few years, most companies have pivoted to work directly with textile suppliers and mills that meet environmental standards. The switch to organic and recycled fabrics has built strong momentum, even with a more expensive price tag. It's likely that people are going to continue asking for fabrics and mill certifications that showcase suppliers' environmentally conscious practices — it's the way forward. The focus on environmental sustainability has significantly impacted the apparel market. Fast fashion is starting to be a thing of the past, with a new generation of consumers demanding sustainable products that last. Of course, the price is higher for better constructions, but it's well worth it for the environment.

Another important factor is workers' rights. Factories must be compliant and ensure a safe and healthy work environment, so employees are not taken advantage of. Suppliers must be aware of the conditions within the mills they are working with.

There are many great fabric suppliers in the digital printing industry. It's important to understand as much as possible about the fabric in order to ensure a successful printing experience. ■

Michael Sanders is the director of printable textiles and finishing technology for TVF. He has been part of the textile industry for more than 40 years and has extensive knowledge and experience in dyeing, printing, and finishing both natural and synthetic fabrics. His involvement and work with digital textile printing goes back to the early days of the discipline's existence. Today, Sanders sits on boards and expert panels and gives lectures nationally.