

Optimizing Variables for Success in Direct-to-Garment Printing

Maybe you are just starting to research direct-to-garment (DTG) printing, or you're an industry veteran looking for the best way to produce thousands of short run images per day. You might be looking to reduce your overhead, to turn more jobs each day, or perhaps you need the ability to produce full range color prints. Whatever your situation, you will need to optimize the DTG variables. Do your homework in advance, and focus on quality, return on investment, and ongoing support.

Quality

You decided that DTG is for you. It doesn't matter if you're looking to complement a screen print or embroidery business, if you produce large volumes of personalized e-commerce, or if you have a storefront and offer to put the picture you just took of Aunt May on a shirt — you need to consider quality, specifically pretreating, environment, and the shirt.

Pretreating is key to producing ongoing, high-quality DTG prints.

Since 2004, there have been two ways of pretreating: Inline and offline. In almost all cases, inline pretreating consists of a wet-on-wet process with pretreatment and ink, while offline involves curing the pretreatment prior to printing.

Offline pretreating requires the operator or a second laborer to add a pretreatment to a shirt, dry it, and then load it onto the printer for printing. You can spray the shirt manually, spray it within a machine (the most common), or transfer it via paper. Each method has its advantages in regard to cost and/or consistency. Offline pretreatment is generally used whenever white ink is printed on a shirt. White or light shirts may or may not require pretreatment based on the desired end look.

Machine-applied spraying requires you to determine the proper amount of spray. You must then determine if you are going to pretreat only where the image is going, or the entire shirt. The former option demands pretreating immediately prior to printing versus in advance. When pretreating, consider this:

1. You can choose to heat press the pretreatment (30–45 seconds) or cure pretreatment through a conveyor. Keep in mind that if the pretreat is not uniform, or not present in the print area on a dark shirt that requires white ink, the result will be scrap. Space savings

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John Albrecht, Sales & Strategy Leader, SPSI



Humidity has always been an important part of consistent DTG printing, and a level of 45 to 70 percent should be maintained to achieve repeatable quality.



Temperature, similar to humidity, plays a role in consistent jetting. Ink is water-based and needs to avoid becoming frozen in transit. DTG printers will also see quality issues when temperatures in the work area exceed 90 degrees.

and lower cost are advantages of using the heat press, though the conveyor dryer gives way to increased productivity.

2. If a separate department is pretreating up to a couple weeks in advance, then, in most cases, the shirts' entire image area will need to be pretreated. This can save time during printing, but the cost of pretreatment will greatly increase due to the larger area, and will allow one operator to load and cure, leading to quicker turnaround time. It is important to keep in mind the higher cost of having employees in both the pretreatment area, and operating the DTG printer. Offline pretreating requires much more handling and labor costs versus inline wet pretreating.
3. Other offline pretreating considerations include the cost per image and final look. The cost will vary depending on products, and could exceed one dollar. Also, keep in mind that you will need to explain to the customer that the square outline latent on the shirt after heat pressing should go away after the first washing. Since offline pretreatment is cured prior to the print, overall cure time will be reduced compared to inline wet pretreat curing.

Inline wet pretreating is, as the name implies, pretreated within the printer. This process allows the operator to pull a shirt straight from the box, load it onto the printer, and then press the print button; the printing press will do the pretreating and ink printing inline. Just like with offline, it is critical that uniform spray be applied, and that the proper amount of spray be determined based on the shirt. Consider this:

1. Inline wet pretreatment requires that the pretreated area be only slightly larger than the actual image. Registration of pretreatment is less of a concern since the shirt is not moved, and the software incorporates the pretreatment area with the art (a set percent over image size).
2. There is no additional staff required when using inline wet pretreatment.
3. The cost to pretreat is greatly reduced based on the size of area being pretreated. In this case the pretreatment cost is also significantly less based on the unique wet process. Cost rarely will exceed a few cents. The inline wet pretreat completely evaporates in the curing process, leaving no need to wash first. You will, however, need to factor in a larger dryer capable of evaporating wet pretreat and ink after printing with inline wet pretreating.

Environment is also of primary importance: Humidity, temperature, and cleanliness.

Humidity has always been an important part of consistent DTG printing, and a level of 45 to 70 percent should be maintained to achieve repeatable quality. There are several ways you can do this: Perform your DTG printing in a controlled room; add humidifiers to the area when the humidity is low; install humidity systems within some of the larger printers. Humidity will affect printers with smaller picoliter openings more so than printers with heads that have much larger openings (especially with white ink). While humidity is key to consistent jetting, filtering, de-gassing and other controls are also necessary when optimizing variables.

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Cleanliness should always be a consideration when working with DTG printers. Keep in mind that there are hundreds, and even thousands of nozzles per printhead on these printers. Screen printing adhesive, lint, dirt and other

environmental contaminants will greatly affect consistent print quality. Be sure to keep the printers away from outside loading doors and other high traffic and less clean areas of the shop. Some manufacturers suggest replacing heads every year while some say heads last five or more years; either way, do not let an unclean environment be the reason you have to go through the high cost of head replacement.

Shirt consideration is critical: Absorption rate, tightness of weave, polyester content, and dischargability.

Absorption affects pretreatment as well as color brightness of the final print. The pretreatment becomes the carrier to help maintain the color on the topside of the garment fibers. Over the years there have been many instances where the absorption rate from one brand of T-shirt is significantly different than that of another brand. In order to best control this variable, it is advised to use as few manufacturers as possible, and dial in set parameters. Some shirts will require a higher percent of pretreat compared to others. You will save time and product by determining this in advance. Check with your shirt suppliers as well as the press supplier to determine the proper settings to optimize pretreating.

Tightness of weave is also very critical in DTG printing. Ring-spun shirts will have a tighter, smoother surface for the digital ink to latch onto. Like absorption rate, you will see a difference in the brightness and quality of a print if you do not adjust your pretreat parameters based on this factor.

You should also consider a shirt's polyester content. Some DTG printers can produce acceptable prints on white polyester material. You will encounter many similar challenges when DTG printing on dark polyester T-shirts as you would with traditional screen printed T-shirts. Dye migration remains an issue. Screen print ink manufacturers have chased this migration by adding bleaches to the white ink for decades. Digitally, the white inks have no dye blockers. The only current way to bypass this issue, to some degree, is to use a process that cures the ink at a very low temperature while trying to maintain washability. Some DTG manufacturers have had limited success with dark poly, although, from a productivity standpoint, there are still improvements that can be made.

Dischargability is a feature offered by some DTG printing presses. Some printers utilize a discharge ink in order to get bright colors on dark cotton T-shirts with virtually no hand or feel to them. Be sure to work with your shirt supplier if you are looking for this type of equipment in order to optimize the best cotton shirts for dischargability.

ROI

Printers want to know if they can make a profit with DTG. To answer that question, you must consider: Consumable costs; labor, overhead and opportunity costs; and the market you are targeting (pricing, volume, fit of the process). These factors will make your return on investment vary greatly.

Consumable costs have a wide range in DTG.

Let us assume that you have sourced a high quality T-shirt for DTG printing. You then need to consider the ink and pretreatment costs. This can get a bit complicated. Ink costs vary from manufacturers, ranging from under $200 per liter up to $900 per liter. Pre-treatment costs vary from nothing (on a white, or light-colored shirt, depending on the desired look) to over one dollar on a dark shirt requiring white ink plus added handling costs. DTG shirts have a printed consumable (ink/pretreat) cost range from twenty cents per square foot to over five dollars a square foot. Assuming a similar amount of ink is laid down on a dark pretreated shirt to achieve the desired color, you will also need to consider ink waste along with ink costs per print. Each manufacturer has their own way of determining ink use and waste. Some have software that estimate based on image size, while others measure number of jets per liter. Make sure you don't just see the per job cost without a waste ink percentage when you are trying to optimize this cost variable.

Overhead costs have many facets.

Keep in mind, with many DTG printers, the operator has to handle the shirt from pretreat, to pretreat cure, to the loading of the print, all the way to the curing of the print. This is especially true if you only have a heat press for curing as with offline pretreating. If one customer comes in and wants one shirt — even if art preparation is not figured in — this process could take six minutes or longer. If your pretreatment process is separate, be sure to factor added employee overhead.

With an inline wet pretreating press, the operator could load the shirt, and then take the next few minutes to finish other orders or do any number of other

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Space for equipment and dryer needs should also be considered. With inline wet pretreating presses, a significant dryer is required for evaporation, and requires more electric or gas. A heat press may be enough for offline pretreatment curing.



DTG is still in its infancy compared to screen printing, embroidery, dye sublimation and other garment decorating processes. When you consider a supplier, look at their history with big equipment sales and support; the focus of the technicians that will service the DTG equipment; and whether the supplier stays on the cutting edge and keeps you up-to-date as the industry changes.

functions. Be sure to factor in opportunity costs when determining ROI. One person may be able to run several machines and produce hundreds of shirts per hour with inline wet pretreating. This may allow for a true one-person operation.

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ROI formulas vary greatly, and every shirt decorator uses something different. In many cases, one machine is cheaper but has higher consumable costs. Another machine may be more expensive upfront, but is cheaper to run or has fewer daily maintenance requirements. The dilemma for many potential DTG buyers is they are caught in the middle: Not enough volume to pay the capital lease for the higher cost machine; too much volume to afford the consumable costs and added employee overhead of the lower-priced machines. A possible solution for some is to work with a decorator that specializes in contract DTG printing until volumes justify entering the market.

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Target market is critical to ROI.

Pricing structures in the marketplace often shape where DTG is most profitable. In traditional screen printing sales, the larger the run the lower the price per shirt; once a job is set up, there is very little added cost to the screen printer. With DTG this is very different. For this reason long-run printing is often not DTG-friendly unless the price charged to the end user does not change dramatically based on run length. It is up to each company to differentiate their artwork in order to create niche markets that are more advantageous to DTG over other forms of garment decorating. Short-run and raster jobs are often cited for DTG. Many companies take the approach of showing what's capable, and can reach farther into other traditional markets. It's now also an option to add DTG to traditional screen printing presses.

Ongoing Support

So you like the quality of DTG and have the market to justify a good profit for your company, but you're wondering where the ongoing support comes from. When entering the DTG market, keep the supplier's reputation in mind.

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Make sure your supplier has a history with capital equipment and a reputation for using these resources to help the client succeed. Check with their client list over the past 20 years to help ensure they will be around to be your business partner. Make sure the supplier and the manufacturer are working together (if different companies) to ensure your success. You do not want to be sold a "box," and then be told to read the details — about figuring out software, parts, workflow, art prep, applications, materials, pretreating, etc. — later, on your own.

Technician expertise is another crucial area for DTG. Being that this is a new industry, some vendors take their general techs and throw them into DTG service. Make sure your needs will be serviced by DTG specialists, and that you have access to support that helps with art prep, file prep, workflow, machine operation, pretreatment, and is a complete business partner.

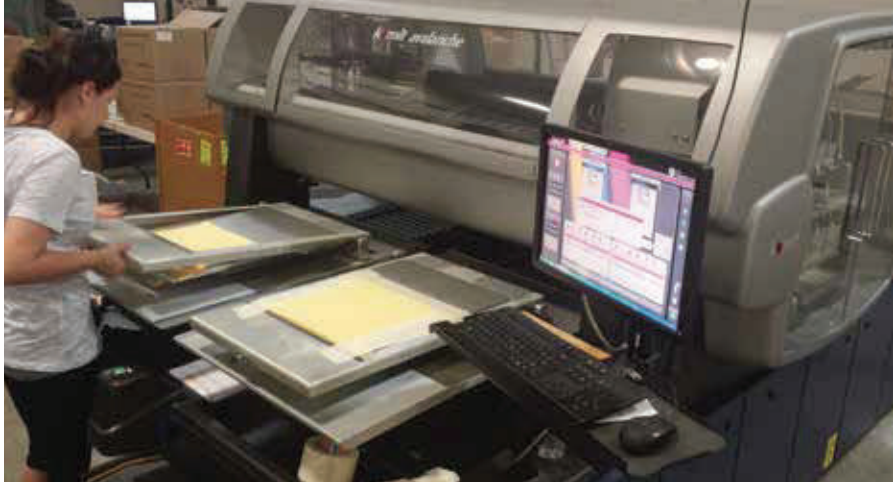
The DTG marketplace is ever-changing, and so supplier innovation is necessary. It's not an easy market, although it can be very lucrative. You need a partner that is connected, and a supplier looking out for the future. You need a supplier that understands the entire garment decorating industry, and one that is investing heavily in R&D, one that you can trust will continue with new ideas year after year. Many

companies purchase the same equipment but produce very different results. Pick the right supplier, and you will be well on your way to producing award-winning prints and making money.

Direct-to-garment printing is exciting. Every day there are new ink breakthroughs, lower costs per print, higher production speeds, higher quality prints, more versatility with substrates, brighter colors, more color options, and more sophisticated workflows. Don't get left behind; by optimizing these few variables; you too can join the DTG revolution!

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