

Dynamic Trends in inkjet T-shirt/Garment Printing

T-shirts, sweatshirts, canvas bags, and other garments have been printed with inkjet technology for more than 15 years. Called direct-to-garment printing (DTG), it is often considered part of the promotional goods printing market. Early DTG inkjet printers were made by start-up integrators who mainly re-purposed Epson A-2 size desktop printers. Brother, and more recently Epson itself, offered their own branded DTG printers, and invested in distribution beyond the capabilities of the start-up integrators. Along the way Israeli-company Kornit developed significantly more productive DTG inkjet printers, capturing the e-commerce market for personalized T-shirts.

The market structure for T-shirt printing was fairly well defined; the majority of T-shirts were screen printed; e-commerce providers who were selling upwards of 1M personalized T-shirts per year replaced low-end DTG printers along the way with Kornit IJ printers, and mom and pop retailers used Epson-inkjet based and Brother DTG printers to produce runs of 1-20 T-shirts which could not have been economically printed using screen print technology.

As we head towards 2020, there are two major trends that are driving unstoppable change to the T-shirt printing market. True mass customization enabled by e-commerce and social media, and a shift in interest towards polyester.

Demographic change driving interest in mass customization and personalization, enabled by e-commerce and social media sites



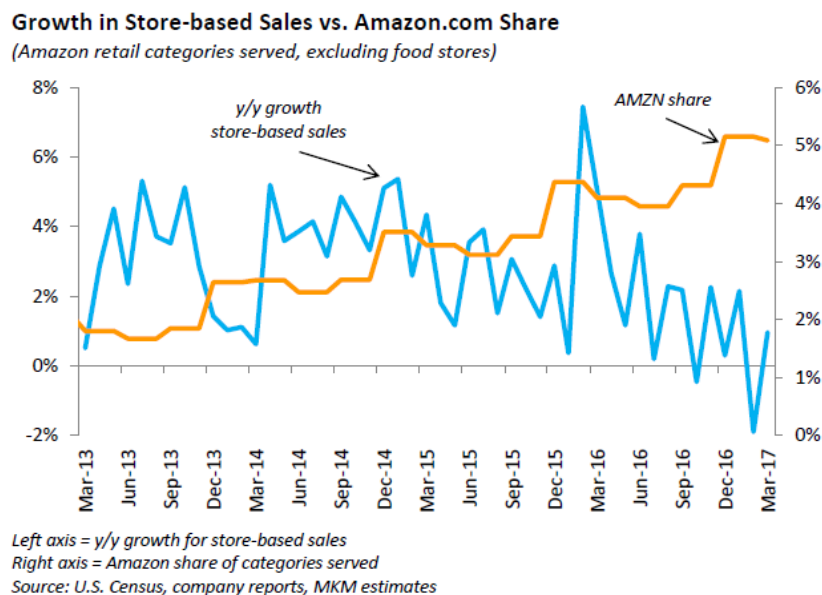
Fashion change driving growth of “tech fabrics” (polyester) at the expense of cotton shirts

T-shirts have evolved to serve not just as clothing, but as billboards that allow its owner to advertise his/her views, membership to a group, etc.. Social media has enabled the masses to communicate their views of the world, and customized T-shirts have become a physical extension of this.

The Impact of E-Commerce and Social Media on Customized T-shirts

While the first generation of DTG users were mainly mom & pop operations, they too are falling victim to the overall shifting trends in retail commerce and home-based crafters. While Amazon turns 25-years old this year and has until recently had minimal impact on the DTG inkjet market, it's continuing growth rate based upon ever faster delivery and convenience (Wholefoods store lockers and 2-hour delivery) is impacting storefront retail operations with higher overhead and less options for customers.

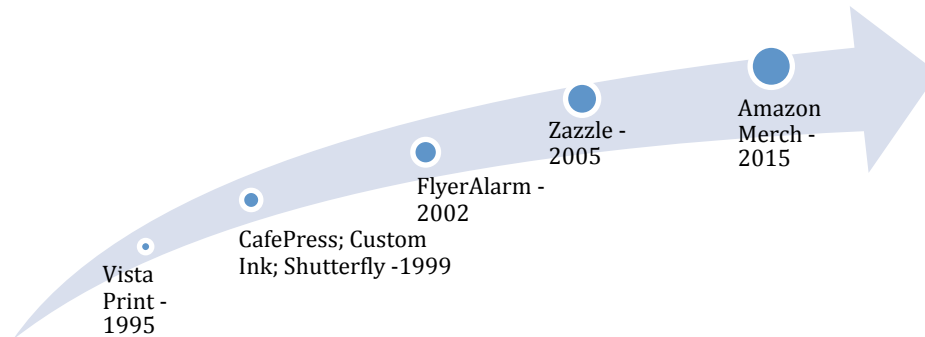
Figure 1 Decline of brick and mortar storefront retailers



Amazon is not an exception, there were many others preceding Amazon's entry into DTG printing. Personalized e-commerce good manufacturers like CafePress, Zazzle, Custom Ink and others were the original liberators of mass customization. Today they produce upwards of 1-5 million inkjet printed T-shirts each. While hugely profitable on a per printed garment basis, it is also a difficult business due to the peaks/valleys of customer demand. Many keep new DTG printers as spares, ready to replace defective printers during peak times. While the printing part is automated, none has solved the issue of removing the manual labor involved in inkjet T-shirt printing, in part because the loading, unloading, folding, and shipping of the T-shirt.

The management of T-shirt manufacturing with dramatic peaks and valleys in demand has become a high hurdle to entry for other e-commerce sites, and has given those who were early to enter a strong competitive advantage.

Figure 2 Leading DTG e-commerce providers



Now about 20 years old, the demand for e-commerce printed T-shirts has slowed to a growth rate in the single digits for the last few years; it's difficult to get repeat orders since much of the demand is tied to single occurrence special events.

While the above trends may not seem to make the DTG market appealing as a high growth market, there are two new, incremental segments that all of a sudden are breathing fresh air into the demand for inkjet printed garments: crafters, and hybrid inkjet technology.

Crafters, Social Media, and Passive Income

Crafters are fueled by social media, tend to be stay-at-home parents, often with creative backgrounds, who have found a market that taps into the demand for a desire to stand out, to be different than the rest, especially among Millennials and younger generations. They create a design, promote it on social media (aided by bloggers who often get a commission if they promote a design), and have e-commerce sites like Redbubble (2006), Teespring (2011), and Merch by Amazon handle the logistics of printing and shipping, while paying out design royalties to the crafters who never physically touch the T-shirt. There are stories abound of crafters generating \$100,000 or more annually from their designs, which live on virtually in perpetuity. It is often referred to as passive income industry.

Chris Lamontagne, vice president of commercial at Teespring, says his site's 5 million sellers have earned more than \$300 million since the company launched in 2012. The average seller pockets about \$9,000 a year from the service. At least 30 people have become Teespring millionaires, and about 3,000 new sellers join the site every day.

Merch by Amazon has become the leader in this field, solely on the basis of traffic. Amazon is currently capable of printing designs on cotton or poly cotton T-shirts in up to 17 sizes and 21 colors. It also offers printing on long sleeve T-shirts and sweatshirts.

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Crafters are invited to apply to become a Merch consigner, through an opaque decision process that apparently includes Amazon managers searching through blogs, social media, etc. to determine how “active” the applicant is in marketing.

Not all are accepted, and the decision process can range from days to months. Merch by Amazon sellers operate on a tier system. Once a person has uploaded 10 designs, she has to wait until she has 10 sales in order to add more. There’s a tier 25, tier 100, tier 500, and so on. The more tiers, the more income.

It's not as easy to make money on Merch as it might appear from the blogs. The average income per shirt is about \$5 to the crafter for a shirt that retails for \$30, but if the shirt is discounted to \$15, the income to the crafter drops by about 50%. And then there is the legal aspect of trademark violations. Amazon searches for and deactivates crafter accounts that appear to infringe on trademarks like movie quotes. Once you are found in violation of infringement, there is no appeal. To be successful, most of crafters success depends on their marketing reach, not the quality of their designs.

Amazon has also stopped limiting uploads during the holiday season of new designs (the peak income season for crafters), for the simple reason that it doesn’t have the bandwidth to handle the logistics of printing, packaging, and shipping more than a certain volume of shirts. Amazon made a \$40M investment and taken an ownership share in Kornit in early 2018 presumably to help solve its productivity issues. Amazon minority ownership in Kornit may limit interest in Kornit printers by other e-commerce DTG printers. In the end Kornit may not be strategic to Amazon either, as the company has a history of changing suppliers if more cost-efficient options arise.

Some of those crafters are starting to take matters into their own hands, and with the introduction of sub-\$5,000 entry DTG printers, are getting into the business of printing their own designs at home. These entry-level printers are easy-to-use (they include for example laser sensors that prevent the printheads from printing if the T-shirt is not perfectly flat on the platen, don’t offer pre-treats), but are limited to four-colors, with “cheap and cheery” output quality that may not withstand as many washings as output printed on more expensive DTG printers. The entry-level DTG printers are serving a market need however, providing immediacy, and lower risk of getting caught for trademark violations because their output volumes is at best limited to 10 T-shirts per hour, and the cost of suing small operators is greater than the benefit of any potential financial settlement. Last year over 1,000 entry-level DTG printers were sold worldwide.

There is one more new category that may well turn out to be the biggest segment for DTG output: the market for polyester sportswear.

Fast Fashion Sportswear

Sportswear has entered the mainstream for daily wear, and brands like Nike, Adidas, Uniqlo, and others have become highly interest in being able to offer short-runs, offering

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versions for special events, without being exposed to long-lead times and excess inventories. Most of the sportswear offerings are made from polyester material.

The challenge with polyester of course it is difficult for aqueous ink DTG printers to print on. There are several options to be able to print shorter-runs cost effectively compared to using traditional screen technology.

Computer-to-Screen	Dye-sublimation inkjet	UV-curable inkjet	Hybrid Screen/ IJ ink
<ul style="list-style-type: none"> • Allows use of traditional screen inks • Preferred for dark shirts with white ink • No variable data/ graphics • Core market is 100-1000 shirt runs 	<ul style="list-style-type: none"> • Vibrant colors • Variable data/ graphics • Multi-step process, slowing productivity and adding process cost • Core market is under 200 shirt runs 	<ul style="list-style-type: none"> • Instant dry • Opaque white inks • New UV ink jet ink technology offers soft hand • Remaining questions about skin allergens to UV-curable ink • Core market is under 200 shirt runs 	<ul style="list-style-type: none"> • Can use screen for white ink underlayer on dark shirts • Uses screen to print pre-treatment/ aqueous ink receptive layer consisting of binders • Allows for full benefit of short-run and variable data/ graphics • Up to 1000 shirt runs

To automate the creation of screens, manufacturers like Riso and Mitsubishi offer computer-to-screen printers that use inkjet heads to create a digitally printed screen. Those screens last in the range of about 1,000 impressions, as opposed to traditionally created screens which offer a life of 5,000 or more impressions. The market for the computer-to-screen products is in the low hundreds of units per year, with most computer-to-screen systems selling for between \$10,000-\$30,000.

Dye sublimation ink are a good option for printing on polyester, but add transfer processing steps and labor cost for garments that are difficult to automate. This is why most digitally printed sportswear is printed on roll fabric with dye-sublimation ink, and then cut/sewn in low-wage locations.

UV-curable inkjet ink is not an obvious choice for garment printing, as historically UV-ink cures to form a rigid image. Newer UV-curable inkjet ink technology claims to bond with individual fibers, which allows for movement and a softer hand/feel. While the ink doesn't have glycols (like some aqueous DTG ink – which won't pass Amazon's ink requirements), competitors cite concern about the ability to fully cure the UV ink, and the risk of skin contact which in some instances can cause allergic reactions.

The solution to meet the needs for productivity and cost for high-volume sportswear manufacturers may turn out to be hybrid screen/inkjet systems. Hybrid systems use traditional screen transport handling, with screen printed pre-treatment, and aqueous inkjet printing. This allows them to print on polyester – the key to meeting rapidly

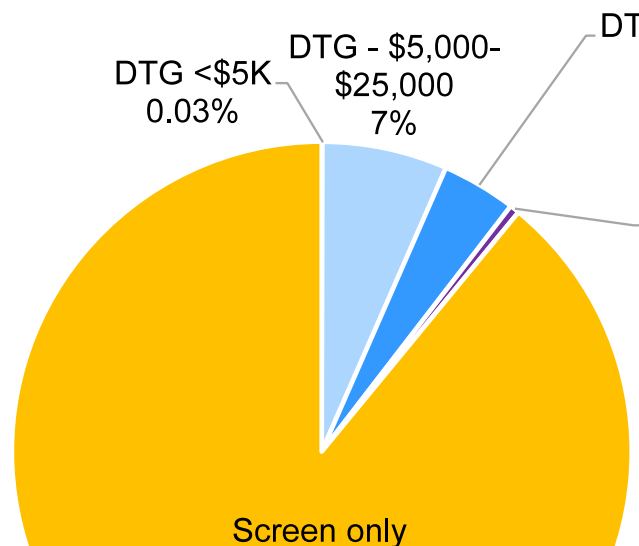
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growing demand for polyester shirts. Hybrid DTG IJ printers been offered in various configurations for years, with modest success. Newer offerings take advantage of advanced screen technology rotary transport handling, plus more sophisticated inkjet printhead integration than in previous generations. Several large sportswear brands have bought hybrid screen/IJ printers for in-house use, printing between 100-500 T-shirts per hour, with great machine reliability.

The Market for DTG Equipment, Ink, and Output

Nearly 90% of T-shirts continue to be printed using traditional screen print technology. It is IT Strategies opinion those screen-printed shirts will never be replaced with digital printing alternatives, as digital printing cannot meet the volume and economics provided by screen technology. However, where digital printing of T-shirts is growing well above the rate of GDP growth is where they create new types of offerings, such as limited edition versions for major brands, and among the crafters creating unique designs enabled for sale through social media and e-commerce print providers.

Figure 3 T-shirts printed, WW 2018 by Technology Type



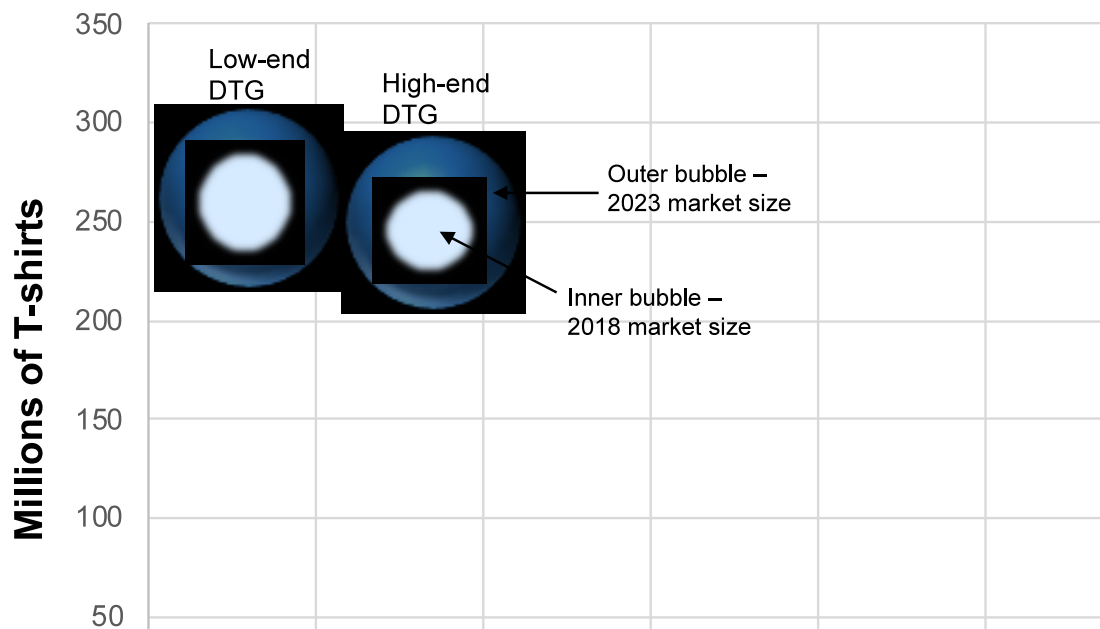
IT Strategies divides the 2018 DTG market into four segments: entry, low-end, high-end, and hybrid inkjet. Popular models in these segments include:

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Entry (<\$5,000)	Low-end (\$5,000-50,000)	High-end (>\$50,000)	Hybrid Screen/ IJ ink
<ul style="list-style-type: none"> •Anajet 100i •Roland BT-12 	<ul style="list-style-type: none"> •Anajet i3000/i6000 •Brother GTX •Brother GT-341/361/381 •DTG M4/M6 •Epson SureColor F-2x00 •Other 	<ul style="list-style-type: none"> •Aeoon Compact/Kyo •Kornit (all models) •OmniPrint Cheetah 	<ul style="list-style-type: none"> •Bihong Q-Jet •DreamJunction OvalJet •M&R DS-4000 •Roq Hybrid •Other

Excluded from our forecast as Oki toner/transfer printers (IT Strategies estimates there are about 1,200 installed WW), and traditional screen-only presses from Anatol, MHM, M&R, Roq, and others. Many of those traditional screen press models are introducing : systems that were intended as hybrid screen/inkjet systems from their initial development. Based upon interviews with stakeholders, IT Strategies believes the hybrid DTG segment is going to grow well above overall market growth rates.

Figure 4 Inkjet T-shirts Printed by Technology



For 2019, IT Strategies has expanded its traditional DTG forecast to include the new entry (sub \$5,000) and hybrid Screen/IJ DTG categories. The low-end DTG printers will continue to dominate unit volumes.

The Bottom Line

The DTG inkjet T-shirt market is a vibrant market. As a leading indicator, Gildan, one of the larger suppliers of blank T-shirts to the DTG market, noted in its Q3, 2018 earnings call that it saw an 11.0% increase in activewear sales, driven mainly due to volume growth in imprintable products in the U.S. It noted that: “Over the last few years, changing market dynamics, such as the growth in on-line shopping, weaker store traffic trends, and overall store shelf space reductions driven by retailer store closures have intensified competition but at the same time presented opportunities for potential growth. For instance, the growth of on-line shopping has reduced barriers to entry and provided greater opportunity for new brands to emerge as space limitation to sell products has diminished. At the same time, retailers and wholesale distributors have increasingly developed their own private label brands as a means of differentiation from their competitors.”

The shift from brick and mortar to e-commerce hasn't necessarily hurt traditional storefront T-shirt providers either. Selling designs on Amazon allows some DTG providers to reach a much larger audience than they could under their own store websites. Printing the shirts and funneling them into the Amazon Prime shipping system means companies can get their shirts to customers without the expense and logistics of establishing its own shipping service.

IT Strategies believes the key sector to keep an eye on in the DTG sector is the new hybrid sector. Products like the OvalJet from DreamJunction (made in China and distributed by Hirsh in the US – the former Kornit US distributor) have sold in excess of 16 units in less than 18 months. Roq, the Portuguese screen press manufacturer, also is making great inroads into the hybrid DTG market. What is notable that hybrid is a new category developing in parallel to the existing DTG IJ market, with new players.

Figure 5 DreamJunction's OvalJet - printing upwards of 300 T-shirts per hour



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The expansion of hybrid DTG into the ability to print polyester T-shirts is what is driving the DTG market forward. Big brands like Disney, Nike, Adidas, and others are becoming large buyers of polyester DTG printed shirts, and are breathing new life into the IJ DTG market.