drupa Essentials of Print

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Good reading.
Sabine Geldermann & Team

A Cut Above – Digital Printing Driving Innovation in Textile Printing.

INTRO

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For decades, digital printing for the fashion, décor, industrial, and graphics industry was relegated to sampling and short run printing. With the advantages of innovative inkjet technology, the industry is now addressing the demand for environmentally responsible output, innovative designs, and the need to improve supply chain operation. This article examines the latest textile industry trends and examines the dynamics that digital innovations have on this massive industry supply chain. Innovations in design, digital print, as well as cutting and sewing of textile-based products.

Ron Gilboa – A Cut Above – Digital Printing Driving Innovation in Textile Printing.

The Textile Transformation

Like many industries, the textile printing market has been changing to adopt new innovative technologies aimed at addressing a new generation of consumers, brands, as well as the supply chain. This massive industry, with over a trillion and a half dollars in annual business value in the apparel and accessories sector, is undergoing a transformation.

Brands must adjust to appeal to a new generation of consumers who shop in both brick-and-mortar stores as well as through online retailers. With the digital age now an economic certainty, brands as well as textile mills must adapt. Many of these changes have evolved in the past decade as early high-speed production digital textile solutions emerged . The changes are impactful in several key areas.

[1]2011 MS Printing introduced Lario first single pass textile printer

Productivity

One of the largest areas in textile printing that has improved dramatically is the ability to produce just-in-time any length of fabrics or garments. With no cylinder or screen make ready, and with the advent of sophisticated workflow automation tools, textile mills can now produce any design rapidly - meeting the needs of designers and brands trying to meet the quick changeover in the fashion industry. Additionally, new innovations in color matching and design are revving up the creative process, shrinking creation time from months down to weeks to even just mere days.

Creativity

In the textile space, improvements in productivity and simplified design have also translated to greater creativity. With the ability to produce single item runs, there is no mass production risk associated with taking new designers on. Many brands are allowing budding designers to enter the fray and compete for mind share and recognition. It is common place today to be able and order quarter yard of fabric from traditional textile mills or a new generation of mass customization on-demand producers.

Environment

Lastly, environmental sustainability continues to rise to the forefront of service provider responsibility.

Research has repeatedly shown that younger generations – particularly Generation Z – prioritize sustainability when it comes to product selection. In many cases, this age group is willing to pay more for products that were created with sustainability in mind. For the textile industry, this means a change. For generations, textile manufacturers have been considered a large polluter, with 20 % of waste water produced by textile mills globally.

[2]https://www.unece.org/fileadmin/DAM/timber/meetings/2018/20180716/UN_Partnership_on_Sustainable_Fashion_programme_as_of_6-7-2018.pdf

Optimizing the supply chain

Now that we have broadly outlined the textile transformation and the factors driving it, we can more fully discuss just how the textile market is changing as digital fabric printing print volume continues to grow at 19 % CAGR (reaching about 4 billion square meters in 2022). With productivity and creativity trends urging companies to adapt a more flexible production schedule that prioritizes product diversity, it is only natural that improvements would come to the supply chain.

[3]Keypoint Intelligence 2017-2022 Digital Textile Forecast

Integration into Product Life Cycle Management (PLM)

When brands plan their next season, they usually resort to the use of a Product Life Cycle Management system (PLM). These tools are aggregators of all the components needed to usher in a new successful season. From managing resources (ERP), design components, collection and ensembles, to patterns and product photography, these collaborative platforms enable all the functions and processes in the creation of next season's products - a coordinated effort from brands, designers, textile mills, and cut & sew operations to the logistics that move products to shelves or ship them out in packages.

Just-in-time manufacturing

While just-in-time (JIT) manufacturing has technically been a term that has existed since the 1960s, it has grown in applicability in recent decades. JIT manufacturing allows new businesses to get their product lines to market in days or weeks, rather than months. For larger organizations, it can mean rapid response to the fashion industry needs to meet seasonal demand. Seasonal variations can be on shelves on time, giving textile companies better ability to please their customers.

Digital printing: Reduction in overstock and warehousing

The shift toward digital printing can also mean improved inventory planning, resulting in less overstock and warehousing needs. As textile service providers move away from longer runs and shift toward short, varied, targeted production – they have been better able to match product to client need.

Clothing can now be made as needed rather than in bulk order, letting companies spend less on inventory that may or may not sell. These capabilities ushered in a new type of fabric suppliers – On Demand manufacturers. These companies use a Purchase Activated Manufacturing business model, whereby production commence only once an order was received and paid for in advance. There are no finished goods in the warehouse just blank raw materials.

Rise of On Demand fabric manufacturing (Mass customization)

With the supply chain being shortened using innovative print technology and continued advancements in workflow, new players have been entering the space over the last several years, empowered by easy online tools that make it simple to start selling customized clothing commercially. These fit into the growing uses of e-commerce in the apparel industry at large, where continued growth will drive estimated revenues up to $145 Billion by 2023 according to Statista 2018 digital market Outlook.

Several suppliers epitomize this trend, pointing out to the need for customization for a community of like-minded people and, on a larger scale, addressing the needs of the masses with diverse customized products.

Spoonflower

Spoonflower has operations in the US (North Carolina) and Europe (Berlin) and has been serving the needs of creative and hobbyist markets for many years. The company has created a community of patter designers that are linked to customers on the company's multi-faceted platform. They can customize fabrics, wallcoverings, and wrappings on the Spoonflower site, while modifying home décor elements on the Roostery site.

The company makes use of digital print technology for cotton and manmade materials that require no extensive use of water for processing, namely pigment inks for cotton and sublimation for synthetics. A key to success for Spoonflower is its on-going R&D, which looks for latest print and workflow solutions. The company also prioritizes maintaining and improving its IT infrastructure, which allows for hundreds of thousands of jobs to be processed annually - from small as 8x8" squares to multiple yards, per client needs. In the world of mass customization, purchase activated manufacturing requires great attention to shop management and production tracking to ensure defect-free output and keep down the margin of error.

Amazon (Merch)

digital printing many years ago when it started printing books on demand. Today, Amazon is an investor in companies such as Kornit, which supplies the company with Direct to Garment printers that enable Amazon Merch's "print per buy" operation. No inventory, no risk of unsold inventory.

Amazon offers its front-end infrastructure to entrepreneurs with designs and ideas and then provides the ability to benefit from Amazon backend infrastructure to get those ideas fulfilled. Its services support both independent designers as well as large-scale brands such as Disney and Marvel.

Users of Amazon Merch also get to take advantage of Prime shipping, one of the leading shipping services in the US, as it has free two-day (and one-day) shipping services. That said, sellers on Amazon Merch will have to split their profits with Amazon, only earning a royalty with each sale.

The Color Soup

Lastly, an example of a traditional textile manufactures with innovations in their blood: Miroglio group from Italy. With several industrial sites, the company operates in 22 countries - providing materials as well as vertically integrated fashion brands. The company has been using single pas inkjet printing since its inception in 2011 and has also been a pioneer in environmental preservation and design innovation. In 2015, the Miroglio group created The Color Soup as an online portal for the creation and ordering of high-end fashion fabrics for anyone with a browser and internet access.

Technology innovation

Clearly, many of these innovative solutions would not be possible without the relentless innovation in print technology and materials science, with the latter driving the use of the various types of inks needed for the best results on a range of fabrics. From Reactive dyes used for naturelle fibers to high energy and low energy sublimation inks, to those specialty inks for silk and nylon printing (Acid), and the emergence of new generations of pigment inks that can print on most fabrics without the intensive use of water as is the case with some textile inks - a world of design freedom and color has opened. Digital printing has evolved from the early 80s where it was used for strike-off only (proofing) to today where single pass sprinters reach speeds of up to 90 meters per minute. With textile specific transport systems, we have seen the impact of printhead reliability improvements and cost reduction enable production systems from 1.8 to 3.2 meters and beyond.

According to the Keypoint Intelligence annual digital textile forecast of 2017-2022, about 12,000 digital printing devices that produce Garment, Décor and industrial fabrics, will be placed by 2022. This will drive a cumulative effect of print volume, reaching about 4 billion square meters of printed fabrics.

There are several groups of products in the fabric printing industry, including scanning head technology, single pass and hybrid systems. Most commonplace systems are those with scanning heads not dissimilar to those used in the sign & display graphics segments. In the textile industry, however, these reach new heights to include in some cases of up to 12 color channels and upwards of 64 printheads to allow for high throughput of thousands of square meters an hour. Many of these as well use a sticky belt that enables the even transport of fabric on through the printer.

Single pass, as the name implies, lays down all colors in a single pass. With its early introduction in 2011 by MS printing from Italy, now part of Dover Corp., single pass has enabled a new area of high-speed printing. Following its introduction, additional single pass technology emerged from a range of suppliers and today the technology is capable of printing upwards of 90 ( ) linear meters per minute. The manufacturers of these systems are diligently working on multiple ink system configurations, inline quality control, and other tie-ins with industry 4.0 standards.

[4]EFI Regianni Bolt 2018

Lastly, hybrid systems – which combine analog and digital systems together. With initial introduction in in China ( ), these systems are capable of harnessing analog rotary screen printing in sync with digital single pass engine to reap the benefits of both technologies. We have also lately seen flat screen analog frames in line with a scanning head printer to form a tight integration between the latest in inkjet with the veteran analog process.

[5]Atexco Vega One

A cut above

Nevertheless, the main hurdle to overcome for many companies is the last stages of the process - namely converting fabrics into garments. Cutting, Sewing, and accessorizing finished garments is still labor-intensive work that primarily takes place in low-wage skilled labor markets such as South East Asia, China, and Latin America. This current workflow requires a level of proximity between textile mills and sewing operations.

As automation encroaches on workforces worldwide, the textile industry will undoubtedly undergo its own evolution. It is long in the making, however, as governments such as the US (through its Defense Advance Research Project Agency (DARPA) fund projects aimed at automating the sewing progress using a multistage sewing assembly line with intelligent sewing machines and sensors. These systems, though with more steps, can outpace human production capabilities due to their potential non-stop operation. To tie garment components together, future threads used for sewing can be digitally dyed on the fly using digital technology by the likes of Twine (Israel), which is in production with garment manufacturer Delta Galil, producing on demand digital thread dyeing.

InfoTrends' Opinion

After several decades of development, digital textile printing is making its impact noticeable on the production volume of fabrics with 6% of share and growing at a double-digit pace. As with many printing segments, this industrial segment is part of expansive supply chain with many facets of raw material supply, brands, designers, producers, cut & sew, and logistical services. Ensuring environmental impact is minimized and delivering customized products are ongoing trends that are impacting this massive industry.

Digital printing technology is being adopted by both established manufacturers as well as entrepreneurial companies that use IoT infrastructure to start mass customization efforts that deliver on demand. Major brands are taking note and looking for solutions that allow them to achieve key business goals - namely high-quality consistent product creation, waste and inventory reduction, and satisfying customer demand for design innovation and personalization.

Many of the lessons learned in the graphics arts industry regarding production consistency and workflow automation are now being adapted by textile printing equipment suppliers for use in their technologies. That said, to create a significant impact, digital printing will need to move beyond quality short run printing. As the suppliers integrate 2D and 3D design that can be printed directly on clothing patterns, we will see automation kick in for cutting, sewing, and integration vertical manufacturing platforms. These will enable micro factories to emerge locally and produce timely customer products that will no longer require outsourcing. When this happens, it will likely be a part of massive supply chain realignment that will take a while to fully materialize.