Innovation to combat textile printing challenges

By **Madelaine Thomas** & **Joseph Link**

Innovation around sustainability to combat key global challenges was the key talking point at World Textile Information Network's (WTiN) Global Digital Textile Conference (GDTC) which took place on 5-6 October (2022).

The event connected key players across the digital textile printing value chain both in its in-person form in the historical printing region of Lake Como in Italy and through its global online audience. A hybrid event expanded the conference's reach at a time when not all global players are able to travel due to current climate conditions – including those related to Covid-19 restrictions.

Whether attending in-person or virtually, delegates had the opportunity to connect with key speakers, companies and innovators.

Key discussions at the conference were focused on supply chain and raw material pressures, including the ongoing energy crisis – especially in Europe. Inkjet's role in alleviating market pressures, reshoring and nearshoring, regulations and government policy around sustainable strategies were also assessed. Critical technology developments, such as the role of the metaverse to grow the industry, dry finishing technology, pigment inks and software to streamline production were also presented.

Host partners for the event were ACIMIT (Association of Italian Textile Machinery Manufacturers) and Sistema Moda Italia (Italian Textile and Fashion Federation).

Sponsors of the event included Kornit Digital, Epson, JK Group, MS Printing Solutions, Konica Minolta and EFI Reggiani.

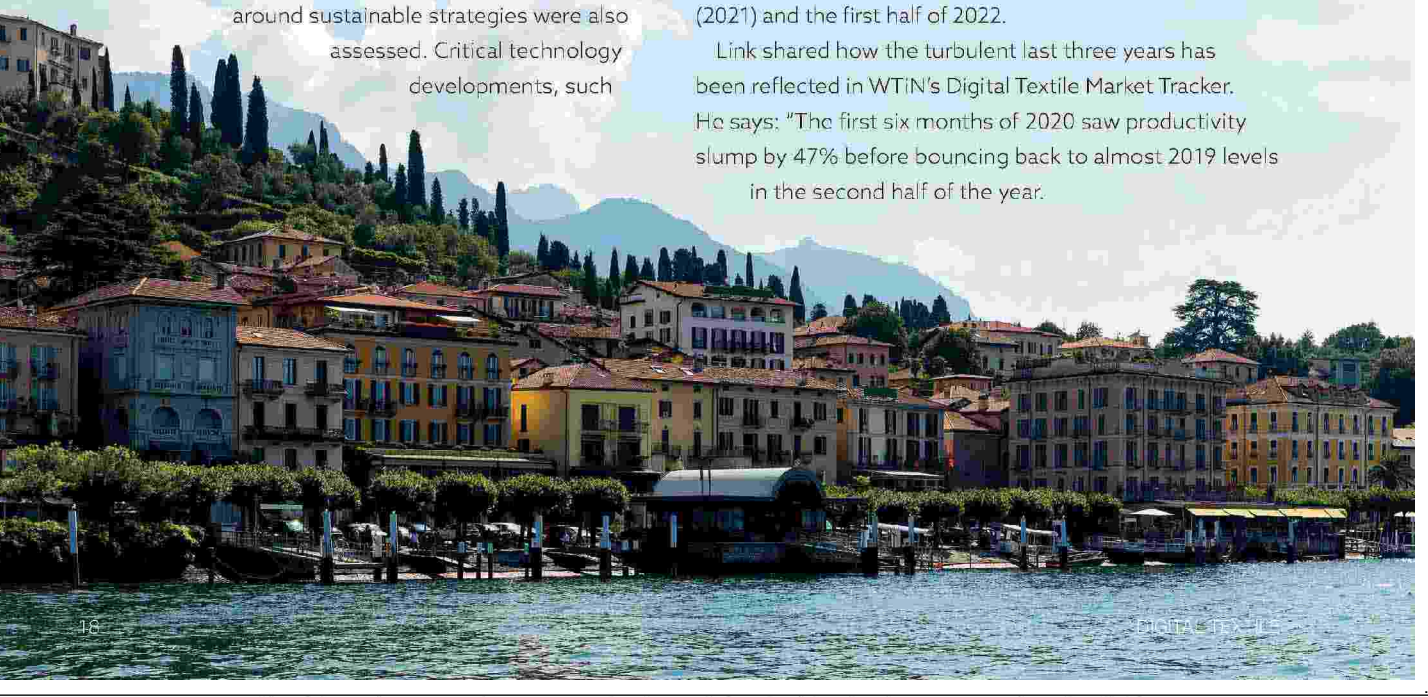
Day One

Market insights

The first day of the GDTC began with an opening note from WTiN's managing director, Mark Jarvis, and ACIMIT vice president, Federico Businaro.

Following this, the first session of the day was a Fireside Chat with Madelaine Thomas, WTiN's content lead, and Joseph Link, the company's digital textiles lead. The discussion shared insights on market data for last year (2021) and the first half of 2022.

Link shared how the turbulent last three years has been reflected in WTiN's Digital Textile Market Tracker. He says: "The first six months of 2020 saw productivity slump by 47% before bouncing back to almost 2019 levels in the second half of the year.



"In 2021 we saw a huge spike in orders as consumer economies fully reopened, but it was this surge in demand across all industries that exacerbated supply chain vulnerabilities which are still causing issues today with a shortage of shipping containers helping to push up inflation and increasing lead times. There were also delays in ports due to Covid-19 measures, but in most countries these have been resolved."

In terms of trends, Link said that reshoring, on-demand manufacturing and pigment printing are key themes. And, he noted, significant growth is being seen in regions such as India and Pakistan.

Importantly, Link claimed that OEM (original equipment manufacturer) strategies are shifting post-pandemic. He said: "We have seen the launch of much faster multi-pass printers, not on the speed scale of single pass but fast enough to meet the production needs of the majority of print service providers. This brings cost savings for PSPs as there are fewer print heads in a multi-pass machine." Thus, showcasing a move away from single-pass – a technology that hasn't seen the growth expected following ITMA 2015 in Milan, Italy.

Link said: "Rather than having one high-volume single-pass printer, some PSPs are realising that multiple scanning printers are more convenient. You can achieve roughly the same level of output with two scanning printers running simultaneously, but you have more security in case a printer breaks down because production won't stop entirely."

The growth of on-demand printing and the personalisation trend also lend themselves to multi-pass technology, rather than single pass. These require more versatile low-volume printers. This is the segment attracting the majority of new installations – according to WTiN's Digital Textile Market Tracker, headed up by Link. It is also accelerating the reshoring movement as shorter lead times are crucial to meeting the needs of modern-day consumers. What's more, localised manufacturing reduces carbon emissions emitted during transportation.

Sustainability, Link and Thomas noted, is crucial to the continued development of the digital textile printing market – particular in the growth of the pigment ink sub sector. However, the market – like much of the wider textile industry – is experiencing challenging times.

Link notes that growth in the market has plateaued but is still in line with pre-pandemic figures, despite all the economic and political uncertainty the industry has and continues to face. Therefore, Link finished with a market projection for 2023: 6% growth in the inkjet printing market, resulting in 3.4bn sqm of fabric.

Technology and business models

A technology-led presentation then followed from Sharon Donovich, marketing director, global events and customer success at Kornit Digital (who also organised a trip for a number of delegates to attend the factory of its customer, Creazioni Digitali, at the end of Day One). In her presentation, titled "The digital transformation: moving from analogue to digital" Donovich shed light on how faster and more cost-efficient production can amplify revenues for both production facilities and brands.

Creating what has been sold, rather than selling what has been created was also discussed. Thus, no inventory would be required, and companies can be more reactive to market developments and trends. This more environmentally friendly, consumer-led model plays into on-demand manufacturing and near/reshoring initiatives both of which are ripe for Kornit's direct-to-garment (DTF) and roll-to-roll printing technologies.

Interestingly, Donovich discussed the metaverse and how, in Kornit's vision for the future, clothing can be printed on-demand in line with digital fashion trends.

Government policy

Dirk Vantyghem, director general, EURATEX, then presented (remotely from Brussels) on how the EU Green Deal and the Covid-19 pandemic are putting the textile industry at a crossroads. The industry must decide on a new business model – embracing sustainability and circularity, creating transparency in the supply chain, promoting innovation, establishing common rules and standards across the globe and developing new green and digital skills. Vantyghem focused on the new EU Textiles Strategy, which was presented by the European Commission in March 2022 as well as how the new EU Industrial Strategy offers great opportunities to shape the new framework.

According to Vantyghem, the EU's vision is for fast fashion to be "out of fashion" and that all textile products placed on the EU market are durable, repairable and recyclable, to a great extent made of recycled fibres, free of hazardous substances and produced respecting social rights.

He continued that in a competitive, resilient and innovative textile sector, producers must take responsibility for their products along the value chain and that circular, rather than throw-away clothes must become the norm, with sufficient capacities for recycling and minimal incineration and landfilling.

With this in mind, Vantyghem set out an ambitious action plan with a new regulatory framework and a transition pathway, promoting a green and digital transition. Audience questions in the Q&A following the presentation arose around timelines and whether the industry needed more regulations. Vantyghem agreed regulations needed to be assessed and simplified.

Sustainability

With sustainability, unsurprisingly, a common theme throughout the morning, Jana van den Bergen, innovation associate, Fashion for Good, presented on "Moving from wet to mostly dry processes: The D(R)YE Factory of the Future".

Fashion for Good and Apparel Impact Institute (Aii) published a report in November 2021, "Unlocking the Decarbonisation Opportunity", which identifies both incremental and disruptive innovations that can significantly reduce carbon emissions within the fashion supply chain. Specifically, there is huge opportunity for impact reduction within processing, in particular, by shifting from wet to mostly dry textile processing.

In her session, Bergen showcased the technologies that Fashion for Good is promoting and the opportunities for impact reduction. Fashion for Good's D(R)YE Factory of the Future Project brings together key players in the industry and several innovators in pretreatment and colouration to validate their technologies. Among the innovative technologies mentioned were foam dyeing (Indigo Mills Designs), plasma treatment (GRINP), laser and plasma pretreatment and finishing (MTiX), spray dyeing and finishing (Imogo and Alchemie), supercritical CO2 dyeing (Deven and Eco2dye) and pre-reduced plant based indigo dyes (Stony Creek Colors).

Bergen claimed that these innovations can reduce CO2 emissions in textile processing by 79-89% and cut water consumption in textile processing by 66-95%.

Progressing the sustainability discussion, a panel session then followed entitled: "Is sustainability within reach of digital textile printers?", moderated by WTiN's Link. The panel included: designer Joshua Roberto Scacheri, creative director, Love Hero; Paolo Crespi, sales & marketing director, Epson Como Printing Technologies; Eliav Priel, vice president business development, Nur Ink; and Gianluca Brenna, vice president of SMI.

During the panel, key topics around sustainability were considered, including how the digital textile printing market can evolve to create a more sustainable future. Market challenges in this incredibly difficult manufacturing climate were examined, as was the growing use of pigment inks and social responsibility in the printing value chain.

Afterwards, Davide Dragoni, product development manager, JK Group – part of Dover Group and Raffaele Guzzon, procurement & sustainability manager at Sublitex, discussed "Sustainability and circularity in dye-sublimation printing within the fashion & sportswear industry". Following the ongoing debate of pigment inks that persisted throughout the day, Dragoni introduced conversation around dye-sublimation inks.

The presentation focus on the importance of raw material selection including certifications (ACIMIT Green Label, ZDHC etc). Guzzon noted that Sublitex made a 99% saving on water consumption using dye-sublimation rather than disperse dyes and used almost 50% less gas in its production and 21% less electricity.

Dragoni also discussed why designing out waste from the beginning of the production process is important rather than relying solely on waste recycling at the end of the value chain.

Supply chain

On-demand manufacturing was a recurring theme throughout the GDTC. However, Guy Alroy, co-founder of Early Vision – an Israel-based technology start-up focused on optimising the workflow and processes related to mass-customisation of garments – addressed the challenges of on-demand manufacturing and how they could be overcome. Alroy looked into how direct-to-consumer business models can be successful in today's manufacturing and economic landscape. These business models, whether large scale or artisanal designer, are enabled by inkjet printing technology, opening-up new design prospects and possibilities.

Also, along the supply chain theme, Lutz Walter, secretary general, The European Technology Platform for the Future of Textiles and Clothing (ETP) assessed the reshoring initiative in the post-pandemic supply chain. In

his presentation, entitled: "Reshoring - strategic agenda for textile innovation", Walter noted that Europe has a real opportunity to recapture a significant share of the textile & apparel market if automation and digitalisation are accelerated; if reskilling and upskilling efforts ease the skills gap and labour shortage; if regulations "get serious"; and if the Pan-Euro-Mediterranean becomes better connected. Europe's growth opportunities also depend on industry bodies and policy makers collectively developing a futureproof smart future strategy, Walter added.

However, he concluded that changes and reshoring will not happen overnight and that high-inflation and geopolitical tensions make any forecasting uncertain.

China

Rounding off the day, Lin, vice president & secretary general, China Dyeing and printing Association, shared developments on China's digital textile printing market. Lin discussed China's strategic priorities within textile inkjet and how the country's print service providers are becoming increasingly self-reliant and offering increased flexibility and production quality. She estimated that by 2025, China's digital printing industry will account for 30% of global digital printing output.

Day Two

The second day of the Global Digital Textile Conference looked at the niche and rapidly evolving industry from a technical standpoint.

The morning session kicked off with a panel discussion consisting of Simon Edwards, product champion at GIS Software and Duncan Ferguson, vice president, commercial and industrial printing, Epson Europe.

The panel focused on the future of Thin Film Silicone MEMS print heads in textile printing. The print head technology is widely considered to be the pinnacle, offering superior drop sizes, speed, accuracy and resolution.

As with many high-performance solutions, they come at a premium. However, in the case of Silicone MEMS heads, the cost is not necessarily picked up by the print service provider, according to Ferguson.

He said: "The investment costs in a Thin Film Silicone MEMs factory are relatively high but, once you have established it, the consistency in production from an automated MEMs factory means you can rapidly bring the cost down over time."

And Ferguson argued that it is a misconception that textile printers equipped with Silicone MEMs heads are more expensive. He added: "Firstly, this may have been the case when they were first introduced to market (...) but I don't think this is true anymore.

"The second point is the actual manufacturing of the chip where the nozzles are – it is only part of the cost of building a print head. And then you have issues of integration such as whether you need a heater, for instance. There are other cost elements that go towards building a head.

"I think the argument is a little bit simplistic when people question the cost of Thin Film heads; it's simply about what head you require for the application you are trying to achieve and how you need to build that head to achieve it."

Edwards said: "It is about total cost of ownership. If you look at the market, the differences in the price of print heads that are achieving the tasks that this group [textile industry] wants to see are not that different when it comes to pricing structure.

"We [GIS Software] work with all print head manufacturers and we see it comes down to reliability. If the print head is seen as a consumable item and print service providers are having to change the heads, then that is a hidden cost that is very hard to quantify. So, a head that is reliable and performs as expected for a longer period of time means you have got a lot lower cost of ownership."

The duo went on to compare the popular Kyocera KJ4B series with Thin Film Silicone MEMs heads and provided details on the performance benefits of Thin Film heads such as nozzle-to-nozzle performance. They also discussed software compensation which helps alleviate issues such as density variation due to differing drop velocities. "This is achieved by changing the image data," said Edwards, which is a specialism of GIS Software.

Pigment printing

Following on from the first day of the conference, sustainability was a theme running throughout many of the second day's presentations and discussions.

Inga Bargende, business development manager & lab head at Covestro, said that the textile industry and sustainability, two passions of hers, are not yet compatible. Bargende was keen to highlight in her presentation the material developments that she hopes will result in a more sustainable textile industry.

The sustainability crisis is an urgent one, according to Bargende. She outlined that the textile industry is the seventh largest in the world yet is ranked the second most polluting. It emits 1.2bn tonnes of greenhouse gas emissions each year.

In total, 62% of fashion items are manufactured in southeast Asia – a region with a dubious sustainability record. Meanwhile, 30% of the world's apparel production is set never to be sold – thus going to landfill.

There are numerous ways to tackle the issues around sustainability. Bargende highlighted shorter time to market, greater individualisation and more efficient production processes. These methods were agreed upon by many speakers throughout the two-day conference.

Covestro is targeting the finishing step of the value chain, specifically textile printing, to reduce the textile industry's environmental footprint. It has studied the reactive, dye-sublimation and pigment ink chemistries to try and determine which is the most sustainable, according to Bargende.

She identifies dye-sublimation as the greenest solution today as it only requires three process steps: printing onto paper, transfer and finishing. But there are drawbacks: the ink can only be applied to polyester and lightfastness shortens the product life cycle. Meanwhile, according to Bargende, pigment printing still requires a fabric pre-treatment for optimum results which tarnishes the chemistry's green credentials.

Covestro has focused its efforts on pigment printing realising that it is enjoying high growth, accelerated by the current energy crisis, despite only occupying a small percentage of the digital inks market.

Throughout her presentation, Bargende studied the technicalities around pigment printing on various applications. She also offered key statistics on polyurethane dispersions for pigment inks. Covestro opted for polyurethanes because they are established in other segments of the textile industry, not least screen printing.

Staying on the topic of pigment printing, Rachel Li, segment marketing manager for textile, sign & display and industrial, Fujifilm Ink Solutions Group, discussed opportunities in pigment inks. She discussed the advantages of pigment printing such as reduced water consumption and carbon dioxide emissions compared to dye-based inks. Li also touched upon the need for OEMs to develop environmentally friendly solutions in order to meet the sustainable demands of modern day consumers, which she believes will drive the future supply chain.

Moreover, Li outlined factors associated with high-speed pigment printing and the chemistry's colour gamut and density. The latter has been brought into question since pigments were first used in inkjet roll-to-roll printing. Like Bargende, Li's presentation also explained how ongoing pigment developments will facilitate a wider range of applications.

US market

One market segment in which pigments are already well established is direct-to-garment (DTG) printing. The US is considered the world's largest DTG market and this was discussed in Victor Pena's remote address to the conference. Pena is founder and CEO of California-based OmniPrint International.

Pena examined why many SMEs in the US fail. He referenced product demand, skills shortages and lack of profitability. "Too much attention is focused on growth revenue rather than profits," he said.

Pena added that education is key and that small businesses should not shy away from investing in this area to improve their resiliency. He reiterated the reasons why digital investments, in his view, are accelerating post pandemic. The biggest factor is cost savings on inventory management due to the fact that, through ecommerce, physical products do not exist until they have been ordered online. This is the fundamental principle of on-demand manufacturing.

Moreover, Pena explained how digital technology is enabling manufacturers to target niche in-demand markets to boost profitability.

Ageing infrastructure

The supply chain crisis has been impacting the growth of the digital textile printing market since the middle of 2021 and this is something Edward Hertzman, founder & president, Sourcing Journal, says is something the business world needs to come to terms with. Never again will businesses benefit from the low freight costs they once enjoyed before the pandemic. In Hertzman's view, comparisons to 2019 are not helpful today.

While consumer purchasing patterns have evolved over time, logistical infrastructure has suffered from a lack of investment. He said: "We are using the same rail, road

and ports to move our merchandise today as we were in the 1980s. And while the pandemic didn't cause these structural problems in the supply chain, it exposed its weak and frail condition and brought it to its knees."

Amazon is a prime example of how buying habits have changed while logistical infrastructure has remained stagnant. The company began by selling books and now sells 51% of all online orders.

Hertzman says if the pandemic taught us anything then it is not to have a single point of failure. It is also important for businesses to build stronger relationships with their factory partners upstream.

Additive manufacturing

Elsewhere, while the Global Digital Textile Conference was focused mainly on inkjet technology, delegates were given a glimpse into the future. It came in the form of Enrico Toson's presentation on personalisation using direct-to-textile 3D printing.

Stratasys' senior marketing manager provided an overview of his company and went on to discuss the technical specifications of PolyJet technology. Toson said his company has been working with a multitude of industries as additive manufacturing can create virtually anything.

The aim is to bring 3D printing to the fashion industry. For that reason, the Israeli company has created 3D Fashion. "The technology supports fashion market trends through differentiated manufacturing and an accelerated design process," Toson said.

But Toson admits that 3D technology is niche and there are limitations around productivity that still need to be addressed. Work is currently ongoing to overcome such drawbacks, but 3D printing advocates argue that the versatility afforded by 3D printing outweighs any disadvantages and will enhance personalisation across the fashion industry throughout the remainder of the decade and beyond.

Another area relevant to the digital textile printing market is software. Whether it be RIP technology or enterprise resource planning (ERP), textile print houses are streamlining their processes and boosting productivity due to the influence of software.. This was discussed in a panel session consisting of Luca Sandron, global account director, Inedit and Ronnie Hagin, CEO, Datatex. The duo discussed the advantages and disadvantages of on-premise or cloud-based solutions and software as a service (SaaS).

While 98% of RIP software is on-premise, according to Sandron, Hagin said that cloud solutions are updated regularly to minimise cyber security threats and maximise performance. He added: "Software can quickly become outdated which is a risk with on-premise technologies, so for businesses – like those in the textile industry – who don't have software expertise but rely on it for their production, then a cloud solution is the obvious choice."

Hagin continued that there is more flexibility with cloud computing whereby users can easily upgrade the technology to meet their growing demands wherever necessary. This is particularly useful for storing big data.

But both Sandron and Hagin believe poor internet connectivity, particularly in developing countries, is restricting the implementation of cloud-based software which is something that needs to be addressed.

OEM strategy

On Day Two there were also presentations from two heavyweights in digital textile printing: EFI Reggiani and Konica Minolta. Both have a range of solutions from lower volume scanning machines through to industrial single-pass.

EFI Reggiani's product manager, Micol Gamba, explained how EFI Reggiani's pigment sales are growing. Gamba also summarised that the priority of the company is to look after its customers during the current energy crisis and high inflation. She added that innovation is part of this aim by giving customers ultra-reliable solutions and enabling advanced factory analytics. Gamba said EFI Reggiani is looking to improve its customers' total cost of ownership which includes education for new market entrants.

Similarly, Konica Minolta's sales director, Gianluca Macchi, discussed ways to support and accelerate the adoption of digital textile printing through technological advancements enabling small print runs and personalisation and by providing a timely response to customer pain points.

The next WTiN GDTC will take place at the much anticipated ITMA Milan in June next year. The conference will be an opportunity to discover new innovations and understand why new solutions are necessary within the textile printing sector. It will also provide updates on the state of the industry in relation to the ongoing energy and supply chain bottlenecks and other challenges that may emerge.

To find out more about the next GDTC, email sales@wtin.com.