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Sustainability influencing key developments

The environment remains high on the agenda across the dyeing and finishing industry. This was evident at the recent Global Digital Textile Conference organised by WTiN.

Whether it be greenwashing or substantial change, businesses believe a sustainable agenda will be key to their growth throughout the current decade.

Of course, there are conflicting views on how to achieve a greener textile supply chain, but many experts believe embracing digitalisation will have a positive impact.

This edition of *International Dyer & Finisher* examines the rollout of digitalised manufacturing processes across South Asia and the impact it will have on the region's economies (pp. 27-29).

While many in the industry agree that digitalised manufacturing reduces energy, water and chemical consumption - as well as enabling a greater degree of versatility - there could be unintended consequences.

The livelihoods of millions across South Asia depend on the textile industry but, as evidenced in Western economies where there are skills shortages, digitalisation requires smaller workforces.

Meanwhile, the market is consolidating - Archroma has acquired Huntsman Textile Effects. *International Dyer & Finisher* covers the takeover in detail on pp. 24-26. Sustainability, according to Archroma, inspired the acquisition.

On the chemical front, the use of PFAS remains a bone of contention. In the US, there are calls for it to be banned in California, but again critics argue about the adverse effects this might have on the economy more broadly. Industry news (pp. 6-11) consists of multiple stories on PFAS, but for more on the green agenda go to pp. 30-33 and p. 36. There you will find the latest on sustainability and regulations respectively.



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4 Celebrating 40 years in business

1982-2022

Biotech firm raises US$120m to sustainably scale

Evolved By Nature, the company creating a proprietary library of Activated Silk molecules from natural silk protein, has secured US$120m in Series C financing to sustainably scale its technology.

The funding was led by Teachers' Venture Growth (TVG), part of the C$242bn Ontario Teachers' Pension Plan Board, and Senator Investment Group, with participation from existing investors including Mousse Partners, Chanel, Jeff Vinik, The Kraft Group, Roy Disney and Emerald Development Managers.

The Activated Silk molecules produced by the company were designed with product performance and the circular economy in mind, according to Evolved By Nature.

The molecules serve as renewably sourced sustainable chemicals, bioactive ingredients and novel therapeutics for use in the apparel market as well as personal care and medicine.

Dr Greg Altman, CEO and co-founder of Evolved By Nature, says: "We've crossed a critical planetary boundary. Overuse of fossil fuel-derived petrochemicals has altered the biochemistry of the human body and the planet's life support systems.

"With TVG's support, we can now reimagine new therapeutics and global supply chains that foster healthier relationships between industries and ecosystems, focusing first on skin treatments and high-performance coatings for leather and apparel."

The funding not only backs the company's philosophy but accelerates the commercialisation of the Activated Silk technology platform, moving the market away from its dependence on synthetics and fossil fuel derivatives.

It coincided with the launch of Evolved By Nature's full-scale manufacturing facility, which aims to ramp up production to 900 metric tons of Activated Silk from 2024.

The company's newly-minted, full-scale production facility in Walpole, Massachusetts, US, opened in May 2022 and currently produces 150 metric tons of Activated Silk per year – a 500% increase in capacity from 2021.

Dr Rebecca Lacouture, president, COO and co-founder of Evolved by Nature, says: "With this investment, we can now make our library of Activated Silk molecules available to global development partners."

She adds: "Together, we can enhance the performance potential of – essentially – any surface."

In the last year, Evolved By Nature's biodegradable finishes have already been adopted by brands including Anya Hindmarch, nylon mills including Alpine Creations and Apex Holdings, and leather tanneries including Richard Hoffmans GmbH & Co. KG, Cyclica Srl and Curtidos Bengala.

Olivia Steedman, executive managing director of TVG, says: "We believe there is vast unlocked potential in utilising silk protein to produce innovative and sustainable products of a high quality that will advance the health of people and the planet.

"Evolved By Nature has a compelling vision to break through new scientific boundaries to reduce our reliance on problematic chemicals and build better, more sustainable supply chains in the process".

Bill passed to end the use of PFAS in US textiles

A bill to end the use of perfluoroalkyl and polyfluoroalkyl substances (PFAS) – also known as forever chemicals – in new fabrics and textiles in California, US, was passed by the Assembly.

The Assembly Bill 1817 prohibits any person from manufacturing, distributing, selling or offering for sale in the state of any new (not previously owned) textile articles that contain regulated PFAS.

Also known as The Safer Clothes and Textiles Act, the new bill requires a manufacturer to use the least toxic alternative when removing regulated PFAS in textile articles.

Authored by Assemblyman Phil Ting (D-San Francisco), the bill would also require manufacturers to provide those that offer the product for sale or distribution in the state with a certificate of compliance stating that the textile article is in compliance with these provisions and does not contain any regulated PFAS.

The bill states exemptions would include many textiles and fabrics used for safety reasons where PFAS fire retardant qualities and other benefits would prove to be invaluable, including vehicle component parts, PPE, military clothing, industrial filters and lab clothing.

Should Assembly Bill 1817 be signed into law, it would become active on 1 January 2025. Assemblyman Ting says he wrote the bill due to growing concern over the use of PFAS chemicals, specifically how they relate to increased environmental and health risks.

However, with concerns over PFAS still growing, Ting decided to have a bill cover all clothing and textiles due to safer alternatives being available that aren't PFAS.

Earlier this year, Assemblyman Ting said "California has already enacted a series of laws to protect consumers and the environment from the hazardous impacts of PFAS.

"These efforts centre on the premise that prevention is the best cure, and my bill would extend this same logic to the textile industry to reduce the harm these substances can cause. There are safer alternatives manufacturers can use."

However, many businesses and companies have come out in opposition to the bill.

Many are protesting that the tight regulations will bring havoc to interstate commerce, lead to differing regulations between states, weaker products without PFAS, heavy economic impact and confusing new regulations for everyone involved in the making and transportation of goods.

Vincent Gatineau, a consumer product legislation lobbyist, told US magazine Globe: "California once again rushes headfirst into passing a bill without looking at all the possible outcomes of it.

"There are health risks surrounding [PFAS] but you need to look at other things too, such as what the economic impact will be or the manufacturing impact."

He adds: "If companies can't continue making these products, they'll either move out of California or close down. There's a lot to this and the people behind it just don't seem to care."

While the bill was vigorously opposed by Grand Old Party (GOP) assemblymembers and senators at every vote – either voting no or abstaining – the bill still had enough support from Democrats to pass.

Waterless dyeing machinery now available in Asia

Taiwan-based JSRTEX has completed its first sustainable dye run using Alchemie Technology's Endeavour waterless dyeing system.

According to Alchemie, JSRTEX purchased the Endeavour machine to dye polyester. It adds the successful sustainable dye run at JSRTEX is a pivotal moment for the industry and a first in Asia.

Steve Lin, chairman of JSRTEX, says: "Sustainability is at the heart of our vision for our business. We are proud to be playing our part in setting new sustainability benchmarks and working with pioneering brands to accelerate the change to a cleaner dyeing and finishing industry."

Alchemie Technology says its machine uses 95% less water and 85% less energy compared to traditional methods.

According to the company, the use of waterless dyeing technology is the first step in JSRTEX's wider sustainable vision – Pureline.

The Pureline concept aims to reduce the carbon footprint and water consumption of each stage of textile manufacturing from the initial fibre to the dyeing and finishing of the final textile.

Alchemie Technology says its machinery will play a major part in Pureline and will also include its Novara digital finishing system.

The Endeavour machine will form the centrepiece of a demonstration hub and showroom in Asia, says the company. There, brands and manufacturers can request to see the sustainable dyeing process in action at JSRTEX's plant in Taiwan.

Alan Hudd, founder of Alchemie Technology, says: "Having an Endeavour demonstration hub in Taiwan and our partnership with JSRTEX is another key milestone on our journey towards transforming the textile industry."

Just recently, it was reported that Alchemie Technology was seeking a partner in China to make inroads into the world's largest producer of textiles.

As Taiwan is the world's seventh largest textile exporter and home to over 4,300 textile manufacturing businesses, it is unknown if the search is now over.

Simon Kew, managing director at Alchemie Technology, says: "We see an enormous opportunity in the relocation of the dyeing industry into new geographies, such as Asia."

Kew adds that the company has had significant interest from China and expects the country to be a major market for Alchemie in coming years.

The Endeavour machine will also be installed in Turkey, India and various European locations during the remainder of 2022, going into 2023, according to the company.

Kew says: "As [Alchemie is] one of the leaders in sustainability and with published plans to support China's industrial base into high technology, we also anticipate that the government in China will be supportive of the transition from low-tech traditional dyeing processes to the latest clean-tech digital dyeing technology."

With resource and material costs rapidly increasing, technology such as Alchemie's is a welcome and sustainable alternative for the dyeing & finishing industry.

Large investment into eco-friendly dyeing

New York and Hong Kong-based TAU Investment Management LLC, agreed for two simultaneous investments into sustainable, waterless textile dyeing.

TAU will acquire significant interests in both DyeCoo Textile Systems and CleanDye Holding as part of it's strategy to invest in sustainable, transparent and responsible supply chains.

TAU is joined by other investors such as Ingka Investments, the investment arm of the Ingka Group, along with Nike Otto Group and customers such as Decathlon, bronprix and Adidas.

Ken Katz, TAU head of Asia investment, says: "In addition to the geographic flexibility and cost savings this technology provides, we're significantly reducing the environmental footprint through this proprietary dyeing technology.

"This technology saves money, reduces environmental impacts, allows for more geographical flexibility and results in better quality products. That is a tremendous advantage."

Today, the dyeing and treatment of textiles is responsible for 20% of industrial water pollution globally. DyeCoo's patented DyeOx technology allows for waterless and chemical-free textile dyeing.

This makes the company a valued partner for some of the largest retailers and manufacturers who are also committed to sustainable technology, the company says. Katz claims that DyeOx technology is faster and results in better colour density than traditional water dyeing methods.

Through its wholly owned subsidiaries, CleanDye operates a textile dyeing facility purpose built in Vietnam exclusively to use DyeCoo's waterless and chemical free DyeOx technology.

CleanDye's dedicated use of DyeOx technology allows it to offer fabrics that have been produced in a hazard-free environment – while realising 50% energy savings, according to the company.

Oliver Niedermaier, TAU CEO, comments: "This is a unique opportunity to support two organisations bringing a new facet of sustainability to the garment industry. We look forward to further application opportunities for the technology in other sectors."

Christian Ehrenborg, senior investment manager for Ingka Investments, comments: "We look forward to having TAU join as an investor, given the industry expertise, broad network and deep understanding of sustainable supply chains it brings. [It] will provide a valuable perspective."

As part of the agreement, TAU will join the boards of directors for both DyeCoo and CleanDye as well as playing an active role in contributing its responsible supply chain technology expertise and industry network. The terms of the investments were not disclosed.

Indigo dyeing machine opened to Argentinian market

Karl Mayer has placed its first indigo dyeing PRODYE-S machine on the Argentinian market. The unit went to fabric wholesaler, ENOD SA, based in La Rioja.

The German company has also supplied a PROSIZE sizing machine to ENOD as it is overhauling its existing plant.

The company says the investment project will see its current plant expanded with a new 10,000 sqm warehouse and a new production hall for weaving. In addition to this, an indigo dyeing plant will also be on site, adds the company.

Stefano Agazzi, the denim specialist for Karl Mayer, says: "We are pleased to be able to contribute with our technology to the market expansion of our customers and to the strengthening of the Argentinian economy."

According to the ENOD SA, with the new capacities, denim can be produced in the country itself, meaning it no longer has to be imported.

The 102 weaving machines are expected to produce 1.4 million metres of fabric per month, and one million metres of fabric will be dyed in the dyeing plant.

The expansion is part of an investment project with the national CLADD group. The company says the expenditure, worth US$36m, has created around 330 direct jobs.

It seems this isn't the only indigo dyeing related news from Karl Mayer. It was recently reported that the company had launched Link-Matic, an automated solution to simplify batch change on indigo and sizing machines.

EURATEX calls for fast energy crisis plan

EURATEX, the voice of the European apparel & textile industry, has called for a strategy to tackle the current energy crisis and ensure the safeguarding of the future of the industry.

It says that a revision of the electricity price mechanism is necessary, an EU wide cap on gas prices at €80/MWh (US$80.16/MWh) and special company support needs to be granted to avoid bankruptcy and relocation of textile production outside Europe.

Alberto Paccanelli, EURATEX president, says: "Given the current situation, a scenario where entire segments of the textiles industry will disappear can no longer be excluded.

"This would lead to the loss of thousands of companies and tens of thousands of European jobs and would further aggravate the dependency of Europe to foreign sources of essential goods."

He continues: "This applies specifically to SMEs who need temporary support measures (state aids, tax relieves, energy price cap) to survive the current crisis and to prepare for the green transition in the longer-run."

Gas and electricity prices have reached unprecedented levels in Europe. Due to severe global competition in the market that characterises the European textile and clothing industry, these cost increases are impossible to pass on to customers.

EURATEX says that this has already led to capacity reductions and entire products halting. Closures and the shift of production outside Europe are forecast and should the current situation persist, it will lead further into de-industrialisation and external dependency.

Specific segments of the textile industry are particularly vulnerable, according to EURATEX. The man-made, synthetic and cellulose-based fibres for instance, is an energy intensive sector and a major consumer of natural gas.

It adds that the disappearance of European fibre products would have immediate consequences for the textile industry and for society at large.

Textile dyeing and finishing are also intensive in energy. These activities are essential in the textile value chain to give the textile products and garments added value through colour and special functionalities – medical applications, for example.

A statement from the EU body, says: "In addition to [the] measures under discussion, we currently observe a proliferation of contradictory, uncoordinated national initiatives to tackle the energy crisis.

"This has led to a de facto fragmentation of the single market, resulting in a chaotic policy and regulatory environment that adds a further strain on our supply chain, which is fully integrated at European level. Measures that guarantee a level playing field in the EU are utmost important."

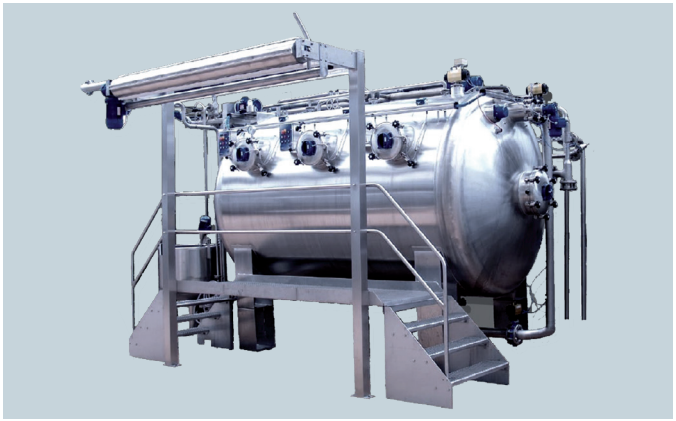
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Politicians urged to rid PFAS in turnout gear

The National Council of Textile Organizations (NCTO) and the American Apparel & Footwear Association (AAFA) have written to members of the House Armed Service Committee urging politicians to revise plans to phase out per-and polyfluoroalkyl substances (PFAS) from performance clothing.

Section 314 of the National Defense Authorization Act (NDAA) proposes to phase out the use of the "forever chemical" in protective clothing like soldier's uniforms, fire-fighting equipment and waterproof and stainproof coating for garments.

Both the House and Senate versions of the NDAA for the fiscal year of 2023, which sets policy for the Department of Defense, would end the purchase of the gear made with the chemical so long as safe alternatives are found.

The typical "turnout gear" for firefighters has three layers — a thermal interior layer, a moisture barrier and an outer shell.

Experts at University of Notre Dame have confirmed the presence of the PFAS and found that chemicals can migrate from the moisture barrier and outer shell layers, contaminating the thermal layer that comes into direct contact with firefighter's skin.

Safer options are becoming more available. Earlier this year, *International Dyer & Finisher* reported on the launch of a PFAS-free stain repellent. Sustainable textile finishing expert Green Theme Technologies (GTT) developed the durable stain protection technology.

In addition, smart textile start-up Soliyarn, based in Massachusetts, US, closed a US$7.7m funding round with Huvis Global, a South Korean textile manufacturing giant and the Commonwealth of Massachusetts, M2I2 Manufacturing Grant programme.

The company is working on a durable water-repellent fabric solution that retains the feel and breathability of the stock textile without the use of PFAS.

The production of PFAS creates large amounts of wastewater. Soliyarn's process removes the use of water in the textile coating. This is a step toward preserving stores of potable water.

Dye distribution extended to US and Caribbean

Specialty chemicals company Archoma has announced it has entered an agreement with Inquisalva-Inquistar for the distribution of its textile dyes in the US and the Caribbean.

Switzerland-based Archroma says its partnership with Inquisalva-Inquistar will aim to better serve customers in the US and the Caribbean, with a dye portfolio designed to create safer and more sustainable colours and prints.

John Florez, head of sales, Central America & Andean Region at Archroma, says: "Archroma and Inquisalva-Inquistar share the same vision that it is possible to create safe and sustainable fashion and textiles that are beautiful and affordable.

"This partnership will allow us to ensure that brands and customers in Central America and the Caribbean can have access to the Archroma dyes portfolio and develop the colour innovations and effects that will help them win on their markets."

Salvadoran company Inquisalva-Inquistar serves customers and markets in Guatemala, El Salvador, Honduras and the Dominican Republic.

The company says it offers a broad portfolio of products for the preparation, dyeing and finishing of textiles, as well as products for water treatment.

Ricardo Salazar, general director at Inquisalva-Inquistar, says: "We are confident that partnering with Archroma will let us offer a whole range of textile solutions based on innovation, technology and sustainability.

"All supported on a network of professionals focused on promoting the optimal development of the business in the region."


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Domestic crisis impacts supply chain



By **Sharleen Suwaris, Raghavendra Verma** & **Poorna Rodrigo**

Sri Lanka's unprecedented economic and political crisis escalated in early July amid mass public protests forcing the country's now former President Gotabaya Rajapaksa to flee the country to the Maldives, before quitting his role.

Notwithstanding the chaos, Sri Lanka's knitwear and woven apparel sector has so far managed to keep the textile industry afloat. Nevertheless, it is revising its initial US$6bn export target to around US$5.5bn for 2022.

Pubudu De Silva, chairman at Fabric and Apparel Accessory Manufacturers Association (FAAMA), tells *International Dyer & Finisher*: "What stands in the industry's favour is the fact that textile and apparel are key sources of foreign exchange to the country.

He adds: "Therefore, keeping factories running is crucial for the industry as well as the country."

At the bottom of Sri Lanka's crisis is a severe shortage of foreign reserves that has seen people queuing for petrol, diesel and cooking gas for days for the limited supply that enters the country.

Staple food and drugs are in short supply too. Inflation has increased sharply to 54.6% in June from 39.1% in May this year, while food inflation has shot up even higher to 80.1% in June from 57.4% in May, according to data from the Central Bank of Sri Lanka.

As a result, the government has provided the manufacturing sector – especially garment and textiles makers – with the fuel stocks they need despite the countrywide shortages, notes De Silva.

Factories have been able to provide transport for workers, in some cases including food, on top of other welfare measures such as healthcare insurance.

And on a positive note, in the short-term, the revised export target of US$5.5bn is still up from last year's textile and garment exports at US$5.1bn, De Silva stresses.

Mike Flanagan, CEO of UK-based industry consultants, Clothesource, says: "Looking ahead [we can see] that next year is going to be tough."

He adds: "Lots of buyers would rather be buying from somewhere less in danger of turning into complete anarchy. Factories are going to struggle to get raw materials and, in the current absence of a government, even putting together a team to negotiate with creditors will take time."

Flanagan says: "In the short-term as well as long-term, the best advice for the industry is to simply keep going.

"It is equally important to get the Sri Lankan government – especially the treasury and the Central Bank of Sri Lanka and its creditors to set up the most friction-free system for getting raw materials in (and, if necessary, paid for) and finished garments out."

This line of thought is echoed by others on the ground. The decline in foreign currency reserves is a key challenge, says a manager from a major textile manufacturer who requested anonymity.

They add: "Regional raw material suppliers, including those in China, India and Pakistan remain concerned, as many Sri Lankan banks are unable to issue Letters of Credit."

Export-oriented organisations can bear the brunt of this challenge through direct transfers of foreign currency earnings.

But knitwear and textile manufacturers relying on the Sri Lankan market for all, or a significant proportion of their sales, are being severely hit by the inability to source materials crucial for operations. This is according to one executive from a small manufacturer of fabrics for Sri Lankan clothing manufacturers.

A manager for a clothing manufacturer serving both domestic and overseas markets tells *International Dyer & Finisher* that shipping problems are due to delivery ships being diverted away from Sri Lanka because of fuel shortages tied in with political unrest and key inputs and the export of finished goods.

Dilhan De Silva, account manager at Colombo-based Texpro Industries, which makes and exports woven fabrics, says that his company, like other larger companies, was being creative to keep operating.

He adds: "Whatever challenges come our way, we always work towards finding a solution so we can continue to function.

"We source fuel essential for transport and diesel for generators using foreign currency, while using firewood to power machinery.

"Because employees find it difficult to report to work, we even provide them with nearby accommodation to support them. Even amid the challenges we are doing our utmost to deliver goods according to customer expectations."

By contrast, textile producers for the Sri Lanka market remain hard-pressed and discouraged by current conditions.

A manager at a smaller textile manufacturing company in Biyagama, east of Colombo – which requested anonymity – says: "We hope for a quick resolution to these issues, as we may be unable to continue like this after the next two months."

Overall, the Sri Lankan textile industry wants the government to deliver a return to political stability and an uninterrupted supply of fuel and electricity.

It mitigates the risks of rising consumer and buyer concerns about the Sri Lankan industry's reliability, which could see orders being lost to overseas competitors, including elsewhere in south Asia.

Raja M Shanmugham, president of south India's Tirupur Exporters' Association, says: "Some Sri Lankan clothing manufacturing companies have been opening back offices in raw material sourcing locations such as India."

The moves are designed to help Sri Lankan companies cope with the foreign currency shortage in Sri Lanka.

As garment production continues in Sri Lanka, despite the political crisis, Indian knitwear makers are not expecting any immediate shift of orders from the island nation but do expect that to happen in the future.

Shanmugham predicts the situation will worsen as shortages, including food, decline further. He adds: "At that point of time, the defecation of orders will happen."

China's finishing sector making synthetic dyeing sustainable



By **Jens Kastner**

Although China's 13th Five-Year Development Outline for the textile industry (2016–2020) mandated sustainability improvements, the government's efforts to improve the environmental performance of its synthetic dye segment has gained significant momentum more recently, under the 2021-2025 14th Five-Year plan.

In June 2022, prominent Shanghai-based "green fashion" brand klee klee, which uses eco-friendly materials and dyeing techniques, degradable packaging and recycled buttons told *International Dyer & Finisher* that of all the synthetic indigo dyes it uses, none are produced in China.

Instead, klee klee's manufacturing partners use a dye developed by an Italian company called Candiani Denim, which has a collection of technologies that cut down the use of chemicals, water and energy.

Candiani's Indigo Juice dye application system is a dyeing technique that delivers a superficial penetration of the yarn.

This allows for dyes to be easily washed away during post-dyeing laundering, creating an easy to achieve faded, vintage aesthetic with only a fraction of the water, energy and chemicals typically needed with conventional laundry processes.

Zhuang Qing, a spokeswoman for klee klee, says: "Other sustainable dyes used by klee klee finishers are mostly imported from Switzerland.

"We have come to know a few Chinese entrepreneurs who are making bio-based synthetic cyan, magenta, yellow and black (CMYK) dye material."

She continues: "[For example], Hangzhou-based Lexiang Sustainability, a bio-based dye developer, manufactures products that do not fade. They are made without releasing toxic pollution and carbon emissions, it claims."

Qing says that bio-based dyes would work in a similar way to chemical dye, but, developers are still in the early marketing stages promoting the dye to factories.

She adds: "One of klee klee's suppliers use an O3 wash in finishing. It uses the oxidation process to wash away some dye and get the colour we want. We also collaborate with factories that specialise in plant dye."

There are several new projects in China that will widen the domestic sourcing options when it comes to injecting sustainability into the synthetic dye segment.

In January, Hong Kong-based textile and apparel manufacturer Esquel Group reported success when China's ministry of science and technology recognised its waterless dyeing technology in the Chinese government's National Key Research and Development (R&D) programme.

This supports and funds R&D by companies promoting social welfare and employment, especially strategic technologies, with projects featuring several well-targeted and defined objectives and deliverables.

Esquel claims that after investing more than CN¥10 million (US$1.5 million) over eight years, its waterless tech effectively solves the textile industry's problem of excessive water usage in the dyeing process.

Esquel says it has massively improved in effectiveness over the years since its first iteration in 2014.

This substitute with a research-proven dyestuff solubility property saves 95% of water conventionally used in the dyeing process and consumes over 60% less water across all its production processes.

Adding that the characteristics solve the problems of reactive dyes hydrolysis, salt-free dyeing, dye promotion and levelling. According to the company, the dye fixation rate can reach more than 97% and the solvent recovery rate can reach more than 99%.

By using this system, there is no need to use chemicals in pre-treatment or post-treatment, according to Esquel.

In the Shaoxing Keqiao Economic and Technological Development Zone, a printing and dyeing clusters project was put into production in October 2021 by three companies - Siris (Ganglong) Knitting, Shaoxing Huashen Textile Finishing and Shaoxing Dushu Printing & Dyeing.

The group plans for an annual production capacity of 10,000 tonnes of yarn and 106,800 tonnes (392 million metres) of printed and dyed fabric.

Continues on p. 14

Continued from p. 13

According to Hanzhou-based upstream textile consultancy CCFG, the cluster is developing functions of production intelligent monitoring and intelligent production scheduling.

Moreover, the group is pursuing intelligent dyeing so that production efficiencies will increase by 30% compared to conventional methods, while labour costs and energy consumption may be reduced by about 20%.

In Northeast China, the provincial government began soliciting investors for a supercritical CO2 fluid dyeing intermediates and dyes project in early 2021.

Supercritical CO2 fluid dyeing is a new type of anhydrous dyeing technology, which has the advantage of high uptake rate, a short dyeing process, recycling of dyes and CO2, along with zero pollution discharges.

The project's total investment is planned at CN¥296m (US$45m), of which CN¥237m (around US$35.4m) is being invested in fixed assets.

The annual output by the project is projected to reach 25,400 tonnes, mostly with ternary colour dyes for polyester CO2 anhydrous dyeing.

The project plant covers an area of 50,000 sqm and includes infrastructure such as production workshops, raw material warehouses, packaging workshops, finished product warehouses and sewage treatment plants.

The provincial government pointed out that enterprises can import fuel oil, natural gas, liquefied petroleum gas and coal from Russia. The Jilin province borders North Korea and Russia and China has not sanctioned Russia over its invasion of Ukraine.

It says the environmental protection policies of major countries in the world have become increasingly stringent, causing the public awareness to be enhanced.

This has meant non-toxic and non-polluting "green fabrics" have become the mainstream in textile consumption.

The production of bio-based materials or biomass-based chemicals could be developed locally by using abundant supplies of waste corn stalks from the region's arable sector and leftover bags used to collect mushrooms in another major local food industry.

The provincial government says that in the future, the dyestuff industry will be a capital-intensive, technology-intensive, talent-intensive, high-input, high-return, innovative industry.

It will also be upgrading the "made in China" messaging so "created in China" will become the new normal for dyestuff enterprises.

Heavy floods disrupt key industry



By **Saeed A Baloch**

With ongoing floods and high rainfall in most parts of Pakistan damaging its economy, the country's textile & clothing sector is bracing itself for the potential cancellation of export orders by international buyers. The industry accounts for nearly 60% of national exports.

The initial assessment of losses inflicted by the devastating rains and floods - especially in Sindh and Balochistan provinces and to a lesser extent in Khyber Pakhtunkhwa (KPK) and Punjab provinces - has already been estimated by the federal government at billions of dollars (it is working on a more precise estimate). The human cost is also huge, with the displacement of 33 million people, 1,400 deaths (including children), the destruction of hundreds of thousands of houses, roads and communication networks.

However, the All Pakistan Textile Mills Association (APTMA) – the largest body in Pakistan's textile industry – is (so far) reluctant to forecast industry losses. According to Raza Baqir, APTMA's secretary general: "It is premature to say anything about the exact loss to the industry [...] give us some time to make an assessment." Currently, the federal government is still assessing the economic damage, he tells *International Dyer & Finisher*.

He continues: "One thing is clear. We will be facing acute shortages of cotton and that will have a definite negative impact on export volumes."

The federal finance ministry has estimated US$18bn in damage to infrastructure alone. Its minister Miftah Ismail, disclosed the figure to media and representatives of the Lahore Chamber of Commerce and Industry (LCCI) on 10 September 2022. He appealed to business leaders to donate at least 1% of their income to the Prime Minister's Flood Relief Fund, launched by PM Shehbaz Sharif.

United Nations Secretary General Antonio Guterres, who was on a two-day solidarity visit to Pakistan last week (9-10 September 2022) called a press conference with Sharif in the capital Islamabad. He also called upon international donors to help Pakistan recoup US$30bn worth of losses caused by the flooding.

According to the Punjab Provincial Disaster Management Authority (PDMA), 300,000 acres of land in the province is inundated with water. This land is very valuable cotton production land and this will cause a cotton shortage in a country whose textile industry has benefited from its local cotton output.

Meanwhile, APTMA says Pakistan will have to import at least 0.9m bales of cotton this year to meet the demand of textile manufacturers. APTMA says the industry's outlook had already been hit by the current coalition government's announcement to end concessional energy tariffs for the textile sector for gas at US$6.5mmbtu – million British thermal units – and is considering scrapping a special rate for electricity at US$0.09 cents/kWh. This had been introduced by the previous government of the Pakistan Tehreek-i-Insaaf party led by former PM Imran Khan, who was toppled by parliament in April 2022. The Sharif government has acted because of pressure from the International Monetary Fund (IMF), which has been negotiating a support package for Pakistan.

The destruction of the cotton crop in the country at such a large scale may force the government to import fibre from India (with whom trade has been frozen over the ongoing dispute about the contested region of Kashmir) as well as other countries, says Emad Raza, chairman of Manufacturers and Exporters Association of Ferozpur Road (MEFRA), Lahore.

"We understand that importing cotton is a difficult option as it would multiply our cost of production and hike clothing prices(...) but we are forced to swallow this bitter pill to run our industry," he says. Emad warns that the resulting excessive cost of business could force many manufacturing units to either shut down their business or lay off staff.

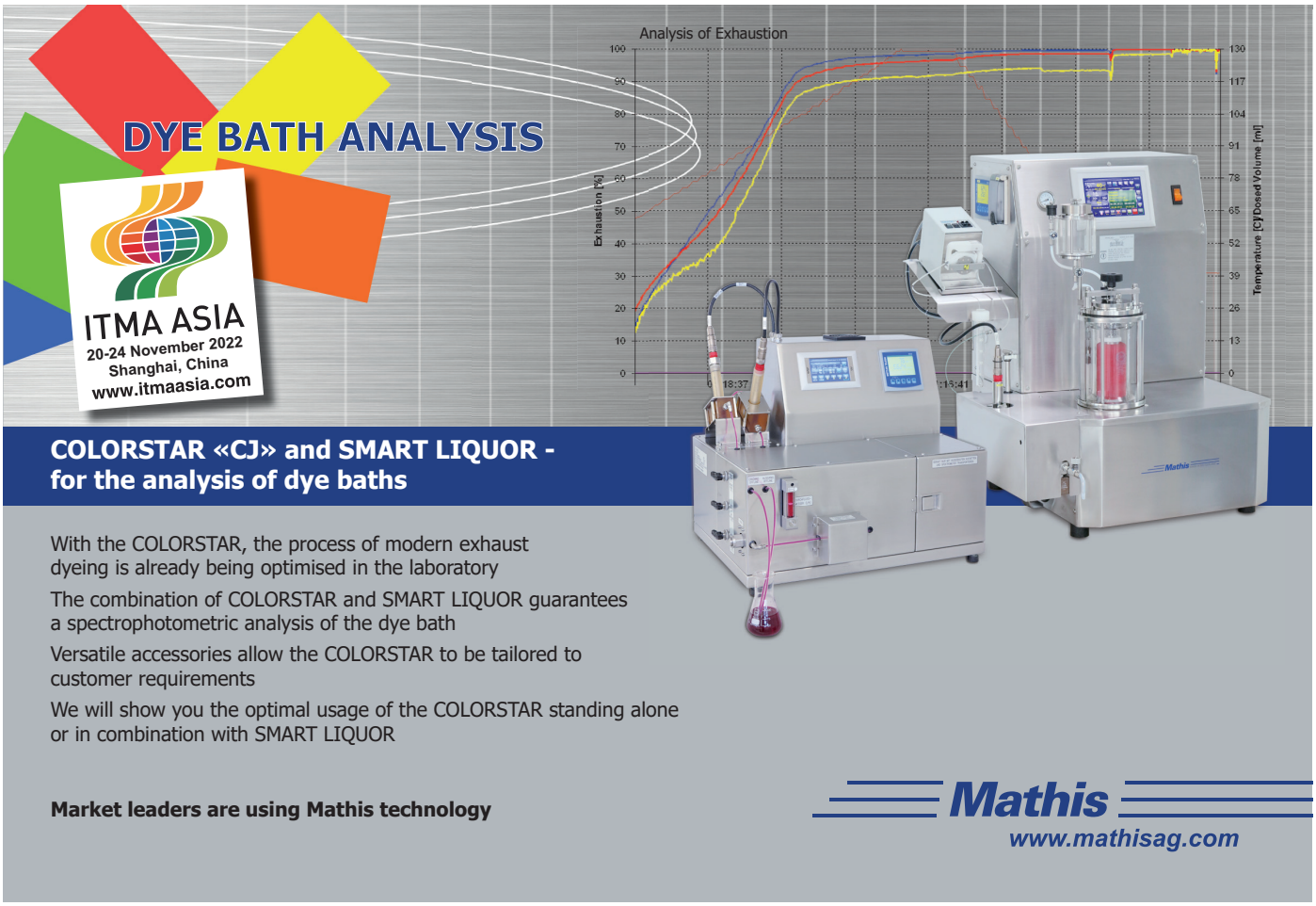
The government is committed to supplying the fibre the industry needs: "Floods and rains have destroyed all cotton fields in Sindh province. Therefore, the country will be facing an acute shortage of cotton, but we are committed to fulfilling the demand of the textile industry by importing the commodity," says Miftah.

Emad stresses: "Raw materials will be the big problem for us, as some people in the industry who held old cotton stocks are charging very high prices." He warns that Pakistan clothing and textile exports may fall 30-35% year-on-year during the current fiscal year to 1 July, 2023.

"I give you the example of my own company which, I fear, may incur a loss of US$7.2m in export revenue as international buyers may divert orders to our rival countries in the region – India, Bangladesh and China," says Emad. He is also CEO of W.E Apparel Inc and an executive committee member of Pakistan Readymade Garments Manufacturers and Exporters Association (PRGMEA).

According to APTMA, in the fiscal year 2021-22 Pakistan's textile sector registered growth of 26% in clothing and textile exports to US$21bn and was striving to implement a government plan to take the overall annual sales volume to US$50bn from the current US$35bn. However, floods have changed the entire outlook, according to senior APTMA officials.

The floods will have a major impact on the entire textile industry. It will take at least three to four years to return to normality, says M.I. Khurram, chairman of Comfort Knitwears in Lahore. He says: "I see a nearly 50% decline in overall export volume in the current financial year 2022-23."



Economic sanctions begin to bite



By **Ekaterina Mereminskaia**

The Russian textile sector has been struggling to cope with international sanctions imposed by the US, European Union (EU), UK, Japan and others as well as the disruption caused by the exit of international companies from Russia following its invasion of Ukraine.

Russia's GDP declined 4% in the second quarter of 2022 and will shrink by 7.8% throughout the remainder of the year, predicts the ministry of economic development.

Textile production has also shrunk as the war, which in its sixth month had killed 15,000 Russian soldiers according to the US Central Intelligence Agency (CIA), fell by 3.9% year-on-year in H1 2022 according to data from Russian statistical service Rosstat. What's more, clothing production fell by 2.8% cotton fabric production was down 7.2% to 390m sqm, and knitted or crocheted fabric production fell 16% to 14,700 tonnes. That said, production of fabric that is at least 85% synthetic rose 2% to 187m sqm. Rosstat stopped publishing foreign trade statistics since Russia invaded Ukraine on 24 February 2022, but Russian textile industry sources say that the import of fabric from the EU has practically stopped (due to sanctions and the difficulty of receiving payments from Russia).

Problems with raw materials

Svetlana Melnichenko, president of the Saint Petersburg-based Chamber of Textile and Fashion, recalls: "The textile market after 24 February was in a daze and bewilderment for a couple of weeks. But then big companies that have qualified staff and a team that knows how to work in difficult circumstances were able to build new supply chains without wasting time." The situation is much more challenging for smaller and new companies, some facing closure, she says.

In particular, the Russian textile and clothing industry is facing a huge shortage in supply of the most popular fabrics, says Melnichenko. With European companies having quit Russia and fabric imports impeded by sanctions, manufacturers are having to innovate to secure supplies. "Europe is not 100% closed," says the chamber president. Companies that have worked successfully in the past with Russian partners have "come up with ways to deliver their products to the country". But she says: "Deliveries are now more expensive and take longer."

As a result, Russian manufacturers are seeking alternative supply sources, notably in Turkey and China, which have not sanctioned Russia. "Turkey is trying to increase its market share and increase supplies. It is ready to execute contracts in national currencies. This is good for Russian enterprises, especially given the strengthening of the Rouble," comments Melnichenko (US$1 bought Russian Rouble RUB60 on 9 August 2022, up from RUB77 on 20 February 2022 days before the invasion, which prompted a short-lived collapse in Rouble values prompted by interest rate rises).

Chinese suppliers are also ready to strike contracts in national currencies. "Fortunately, imports from China do not stop, but the price of the fabric has increased due to the rise in the cost of raw materials on the world market," says Andrey Mikhailichenko, director of Russian fabrics and textiles wholesaler Continent-Textile.

Polyester fibre prices have risen 25% over the past six months because of oil price rises, he says. That said, unlike Turkish exporters, Chinese suppliers did not immediately begin to increase exports to Russia, fearing breaches of western sanctions, he suggests. "There are no new proposals from Chinese suppliers," says Mikhailichenko. "If earlier I was constantly receiving offers from unfamiliar Chinese companies in the mail, now their number has noticeably decreased. Many of those Chinese firms that are active in western markets seem to be trying to avoid working with partners from Russia now."

Silk, cotton and linen have traditionally been imported from India, another country that has declined to impose sanctions on Russia, with business continuing. It is the same for deliveries from nearby Uzbekistan, with exports to Russia of cotton, knitted fabric and T-shirts being sold in significant volumes.

Such near-sourcing matters given transport costs have risen 2.8-3 times since before Covid-19, with costs rising another 10% in 2022 due to sanctions and related supply chain problems. European ports remain closed to Russia, all deliveries go by land through China and through Vladivostok and Nakhodka in the Russian far east. "Everything rests on the bottleneck in the east and there is no reduction in price," says Mikhailichenko.

He continues: "In addition, related services are becoming more expensive – customs brokerage services, agent commissions, cargo clearance. Bank transfers have become more difficult. Our bank is not disconnected from SWIFT, but if earlier we sent money and the day after tomorrow they were with the recipient, now transfers arrive in seven to 10 days."

Domestic demand needs adjustment

While Melnichenko says that overall domestic Russian clothing and textile demand has not fallen for her

members, Mikhailichenko has seen his business decline. He says: "It was not sanctions, but changes in demand. Knitwear, children's and sportswear, which are produced by buyers of our fabrics, are not an essential item. Their purchase can be postponed until better time. "Government purchases have also fallen, with local budget expenditure on maintaining sports teams and other children's organisations falling." Companies have reduced advertising costs and PR, so orders for branded blankets, T-shirts, sweatshirts and more have been cut.

This trend has continued for months. Mikhailichenko adds: "In the past two months, our company's sales have halved. And the rest of the players in our sector have the same results on average."

To cope with such shifts, Russian factories need to develop and modernise production, increasing their product range, says Melnichenko. The ministry of industry and trade is encouraging such development, but sanctions are hindering progress.

"In the long term, the industry will face problems with [sourcing] equipment of clothing enterprises," says Mikhailichenko. "Most is not imported from China, but from countries that have imposed sanctions." To make sophisticated knitted fabrics, good equipment is needed, integrating software controls. "Already now there are difficulties with maintenance, repair and supply of spare parts for such equipment. And these problems will accumulate and the industry will sag," predicts Mikhailichenko.

As a result, Russian sales may focus on fabrics processed with simpler equipment: linen, cotton, wool, which can be produced domestically and imported from central Asia. Orders will also be received from the defence sector, the focus of public spending as the war continues. But, according to the wholesale executive, there will be problems in the fashion segment.

Melnichenko says the Russian industry would have to work hard to exploit openings created by the departure of international mass market brands such as Zara and H&M. "We have insufficient popularity among consumers. People are used to dressing in clothes from large world chains. Few people trust domestic manufacturers, although they exist," she says, citing the Melon Fashion Group's Zarina, befree, Love Republic and Sela brands. "These are known, loved and bought from the mass market segment," she says. Meanwhile, 12 Storeez, Akhmadullina Dreams and Exactly Dress are middle price brands with followings, although they lack volume sales. Melnichenko continues: "It is just the time for such brands. We need to win the trust of consumers."



Bio-based finisher claims to reduce allergens

HeiQ is launching HeiQ Allergen Tech, a 100% biobased, proprietary textile finisher that can be used for home textiles as well as textiles used for furniture and public transportation.

The Switzerland-based company says the technology reduces inanimate allergens, such as house dust mite matter and pet allergens, and can be easily added in the finishing stage of the manufacturing process.

It adds the technology creates an invisible protective layer that lasts at least 20 washing cycles and beyond, according to performed tests.

Dr Robin Temmerman, chief executive officer (CEO) of HeiQ Chrisal, says: "It's exciting to launch the world's first 100% biobased anti-allergen technology for textiles.

"Our proprietary HeiQ Allergen Tech achieves an impressive reduction of allergens that can become airborne in our living and sleep environments, in nature's way.

"It has a full biologic origin and utilises the natural process of probiotic colonisation on the textile surface to effectively reduce inanimate allergens."



HeiQ launches HeiQ Allergen Tech making home textiles sanitation easier and longer lasting

According to the company, several tests have proven the effectiveness of HeiQ Allergen Tech in reducing the levels of house dust mite matter (96.6%), allergens from dog hair (76.5%) and cat hair (83.6%), keeping a durable effect even after frequent washing.

Following these results, Allergy UK has assessed and certified HeiQ's new allergen control textile technology, says the company.

New screen-printed silicone anti-slip inks

Boston Industrial Solutions Inc launches Natron-SilTex AS Series screen printing silicone inks for socks and gloves with anti-slip (high coefficient of friction) designs.

According to the company, based in Massachusetts, US, the ink is made with high-quality, environmentally safe and low-energy curing silicone polymers.

The company adds that the anti-slip feature allows for high-friction grip regardless of the textile substrate and the product printed on it. As the ink is made of silicone, it bonds well to natural fabrics such as wool and cotton.

The ink is available in clear and solid colours and has a high gloss effect. The company says the silicone ink is durable, has a low drying temperature (100-121°C), is washing and abrasion resistant, as well as PVC-free and permanent.

A representative from Boston Industrial Solutions comments: "We're excited to offer this dotting silicone ink to customers as an addition to our leading apparel screen printing silicone inks.

"This new printing ink will enhance offerings to customers by enabling them to print on slipper hospital and promotional socks, gloves and more."

According to Boston Industrial Solutions, this screen-printing ink benefits apparel manufacturers, socks manufacturers, sporting goods manufacturers, branding agencies, promotional products as well as a variety of other organisations looking to offer PVC-free prints.

Nanophotonic coating aids thermal management

A visibly transparent and infrared reflective coating for textiles has been devised by researchers from the University of Illinois Urbana-Champaign, based in the US.

Designed with a nano-mesh structure, the coating transmits visible light – including sunlight – and reflects body thermal radiation like conventional metal-based textiles, according to Professor Lili Cai and her team.

Previous studies have shown that when materials, which reflect radiation from the body are worn, the wearer's body temperature increases.

However, most of these materials are metal with a distinctive colour, making it challenging to use textiles in other colours. Additionally, they reflect most solar light, which makes the absorption of sunlight for outside warming difficult.

Cai and her team were able to utilise various colours of textile to achieve a warming effect without energy consumption.

In addition, by combining the nano-pore structure with a photothermal material, the researchers were able to confine both sunlight and thermal energy from the body inside the textile.

Even in freezing weather, the coating achieves a 15°C (59°F) higher heating effect than commercial clothing. This could allow more outdoor activity during the winter months without the need for bulky clothing.

However, researchers say applications for this technology go beyond personal heat management. The reflective coating can be used in counter-surveillance military applications – specifically, to provide camouflage under the scrutiny of thermal imaging cameras.

Their tests of the thermal camouflage effect, at temperatures ranging from 34° to 250°C (93° to 482°F) proved promising that it could successfully be used for both day and night cloaking.



Natural dyes for lace get high colour match

Noyon Lanka (Noyon), a subsidiary of MAS Holdings, has introduced Planetones: a 100% natural dye solution for lace.

According to the Sri Lankan based company, Planetones is the world's first 100% natural dye solution for nylon lace, which has received the eco dye standard from the Control Union.

It also complies with the zero discharge of hazardous chemicals (ZDHC) manufacturing restricted substances list (MRSL) – Level 1, Oeko-Tex, as well as holding a transaction certificate (TC) from the Control Union.

Made using natural colour sources such as cranberry and achiote, Planetones has been tried and tested on a range of nylon bases.

When compared with a synthetic dye, the company says water and energy savings are estimated at approximately 30% and 15%, respectively, boasting a significant reduction of chemical load to effluent.

The solution has an 85-95% colour match, a rarity for natural dyes given that no two natural sources (two fruits of the same type, for example) are exactly alike, says Noyon Lanka.

In terms of colourfastness, the company reveals the solution scores 2.5-3.5 to light and 3.5 to other materials. It adds its colour repeatability is also high – between 90% and 95%.

Planetones currently offers 32 shades of colour and has been commercialised with two leading European fashion brands.

The dye solution and its intellectual property (IP) will be extended by Noyon to other supply chain partners within the MAS Group, says the company. This enables manufacturers such as Trischel, Stretchline and Prym to also offer certified naturally dyed elastics, accessories and fabric.

Noyon Lanka's CEO, Ashiq Lafir, says: "This innovation is an important milestone in Noyon's sustainability journey. We are also actively collaborating with other stakeholders in the supply chain to make this solution available to them. We hope this will initiate momentum towards producing a garment that exclusively uses natural dyes in the near future."

He adds: "While we take pride in this innovation, this only represents the beginning of our journey. Through innovations that are currently in development, we are confident that we can produce solutions that are even more sustainable."

The natural dye solution is part of Noyon Lanka's green vision. The company says 100% of the dyes and chemicals it uses are Bluesign-approved.



A lace product coloured with Noyon's natural dyes



Noyon Lanka says the naturally dyed lace is soft on both the body and the planet

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Sustainable bleaching with hydrogen peroxide

By **ZAITEX S.p.A.**

Today, saving time and energy is a priority, especially in production processes requiring a great amount of both. In the textile industry, you may include processes involving huge dyeing machines such as over-flow, jet or autoclave systems.

Nowadays, news reports say emergency interventions will be drawn up to try to stem the impact of surging prices for power and natural gas on industry, businesses and households. So just being aware that small measures in energy saving will be strongly significant in the near future means a lot.

For almost five decades, ZAITEX has helped textile dyeing plants, laundries and fabric manufacturers apply eco-friendly, certified dyes and auxiliaries. The motivation is, and has always been, to optimise production performance for customers. To help customers cope with the challenging task of reducing overall energy consumption, ZAITEX has an efficient idea impacting a specific step of textile dyeing production: the bleaching of cotton.

The process of bleaching cotton involving hydrogen peroxide (H2O2) is conventionally carried out under high temperature and strong alkaline conditions.

ZAITEX's textile technicians developed a low temperature cotton bleaching process called the EB Process. It is designed to allow the discontinuous bleaching with hydrogen peroxide of cellulosic fibres and blends with elastane. It boasts a maximum working temperature range between 75°C and 85°C and a neutral pH of the bleaching bath.

The EB Process consists of an enzymatic system that allows the simultaneous degradation of pectins and natural pigments that are present on the cotton fibres.

The combination of two auxiliaries called ZETALASE EB and ZETAKIN EB is the core of ZAITEX's EB Process.

ZETALASE EB allows the obtainment of articles characterised by soft, full and natural hand. It features lower creasability, better sewability, strength and elasticity. It leaves the material with its natural soft touch and at the same time gives optimal hydrophilicity to the textile substrate.

Meanwhile, ZETAKIN EB is an adjuvant activator of the reaction of hydrogen peroxide in discontinuous bleaching of cellulosic fibres free from heavy metals.

They both have to be applied together with ZETAPON EB – a combination of wetting, detergent, dispersing and sequestering agents. It regulates, with a single and easy dosage, the development of the hydrogen peroxide, chelates calcium, magnesium and iron ions, conferring thanks to its high wetting-detergent action, very good penetration in the bleaching bath inside the fabric and therefore allowing a strong extractive action of the different impurities. It does not generate foam.

Another key point of the EB Process is the final pH of the bath, which turns out to be neutral or slightly acidic. This avoids an additional rinse to neutralise the bleached cotton with a substantial saving of energy, water and time.

To sum up, the EB Process achieves several advantages for cotton fabric, such as:

- Soft hand
- Acceptable white degree for pastel tones
- Reduction of bleaching time
- Lower weight loss of the material
- Lower loss of resistance
- Lower energy consumption
- Time, temperature and water saving
- Low alkalinity in effluents

The EB Process has already been tried-and-tested in several production plants, highlighting crucial advantages in reducing the bleaching time. For instance, less time required to complete the process thus saving energy and increasing production efficiency and less damage to the fabric by limiting creasability and loss of fabric resistance.

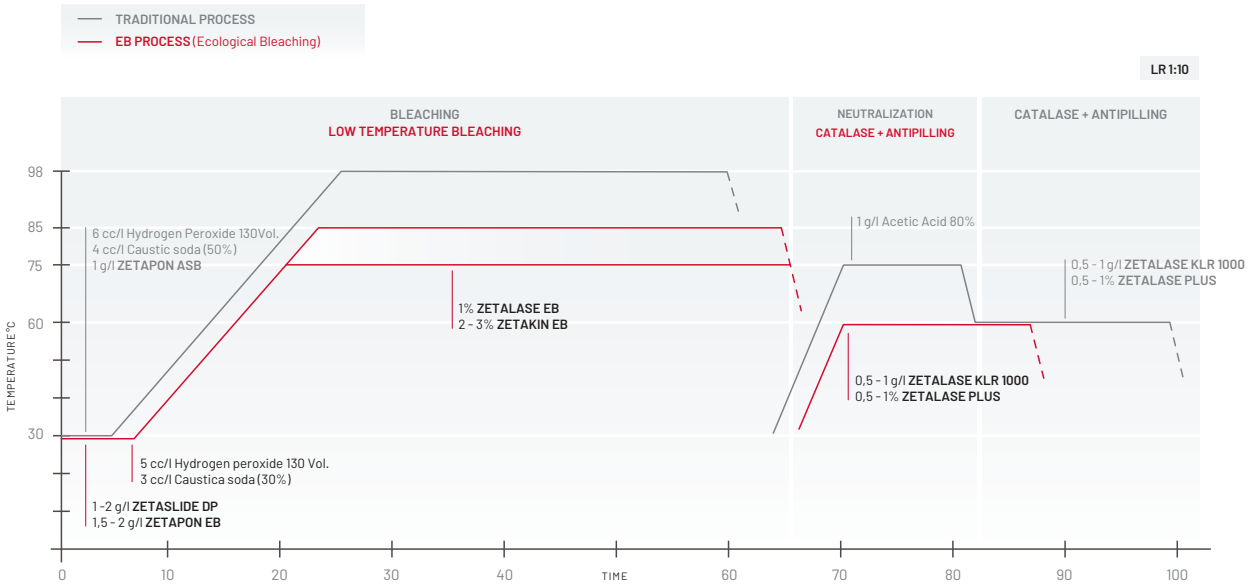
The study ZAITEX technicians conducted is aimed to highlight all those features above. Several tests have been run in different situations in order to compare each result. Considering the outcome derived from the application of a standard bleaching recipe, which the lab technicians are used to following as a reference, the study makes a standard raw cotton fabric, bleached according to several conditions, as stated in the table (see p. 23).

The study includes three other tests: two of them were run in ZAITEX labs, one at the minimum suggested temperature of application of the EB Process (75°C), the other one at the maximum temperature (85°C). The last test was run in a small dyeing machine used for pre-production trials.

The use of this latter machine was gently granted by ZAITEX customer F2 Lavorazioni Tessili, a textile finishing company highly experienced in the dyeing and finishing of natural and man-made fibres, located in Schio Italy.

Carrying out a test in a dyeing plant is the best way to measure how effective the lab tests are.

All test results lead towards an acceptable degree of white of the bleached cotton, plus it is easy to notice that the pH of the bleaching bath turns out to be slightly acidic. This value demonstrates that it is possible to avoid an additional rinse to neutralise the bleached cotton.



Tests conducted in ZAITEX labs conclude, as does the one carried out in F2's facility, that the EB Process enables an acceptable degree of the white on bleached cotton. Benefits include saving water and energy by removing the need for an additional rinse and enabling a lower working temperature.

Considerations

Let's briefly comment on the data in Table 1, focusing on the results from the standard recipe and from the test of EB Process conducted in the pre-production machine in F2's facility.

On one hand, values of estimated hydrogen peroxide leftover suggest a similar result for both tests.

On the other hand, out of the two, the recipe applied in F2's facility turns out to require less time and has a lower pH value of the bleaching bath. This does not indicate there would be a higher development of hydrogen peroxide and thus the chance to avoid an additional neutralising rinse.

Despite a higher Stephansen level of whiteness value in favour of the standard recipe, we might all agree that it does not mean the bleaching process results are far better due to the factors involved in the evaluation. For instance, the hand of the fabric or its resistance capability.

Products applied	Standard recipe ZAITEX	Tests run in ZAITEX Lab		Test run in F2 facility
Liquor ratio		1:10		
ZETAPON EB	1 g/l	1 g/l	1 g/l	1 g/l
Hydrogen Peroxide 130 Vol	6 cc/l	5 cc/l	5 cc/l	5 cc/l
Caustic Soda 30%	4 cc/l	3 cc/l	3cc/l	3 cc/l
ZETALASE EB*	-	1% p.m.	1% p.m.	1% p.m.
ZETAKIN EB*	-	3% p.m.	3% p.m.	3% p.m.
Working conditions	98°C / 20 min	75°C / 40 min	85°C / 40 min	85°C / 30 min
Initial pH	11,53	11,40	11,38	11,49
Final pH	10,97	7,08	6,84	7,56
H2O2 leftover	500 mg/l	1000 mg/l	500 / 1000 mg/l	500 mg/l
Stephansen degree	77,93	66,11	69,57	70,89
Notes: * added in bath when in temperature Stephansen degree of the raw cotton is 29,54.				

Table 1

Since almost any process has to be fine-tuned, case by case, ZAITEX is focused on the research and development (R&D) activity for the best performance in the preparation, dyeing and finishing of mostly any kind of textile fibre and for the majority of the production processes. An ideal partner to choose for those manufacturers that seek reliability and knowledge for industrial textile application.

For more information, visit www.zaitex.com.



MERGING ENVIRONMENTAL GROWTH

Following Archroma's acquisition of Huntsman Textile Effects, **Madelaine Thomas** speaks to **Heike van de Kerkhof**, CEO of Archroma and **Rohit Aggarwal**, president of Huntsman Textile Effects, about the direction of the companies going forward and the future of the textile chemical and dye industries

The textile chemical and dye industry is getting smaller. As the industry becomes more competitive, with evolving challenges, players in the market are consolidating. WTiN recently reported on global specialty chemicals company Archroma and its plans to acquire Huntsman Textile Effects.

Now, Heike van de Kerkhof, CEO of Archroma and Rohit Aggarwal, president of Huntsman Textile Effects have opened up about the acquisition and what it means for the industry going forward.

The sale

Huntsman Corporation initiated a strategic review of the Textile Effects business late last year to explore whether a divestment would be the best way to further the company's strategic goals and create value for shareholders. Peter Huntsman stated in December 2021 that "while its [Textile Effects] value-added portfolio of sustainable products is consistent with Huntsman's strategic direction, there may well be an external party that recognises the value of these extremely attractive assets and will be a better owner for them."

Archroma thought to capitalise on this opportunity. Kerkhof says: "Huntsman communicated publicly in December 2021 its intention to conduct a strategic review of the Textile Effects division, including a possible sale. For Archroma the timing was also right, as we had successfully completed the integration of the textile chemicals business of BASF acquired in 2015, as well as M Dohmen, a specialist in automotive dyestuff."

She adds: "Since its formation in 2013, Archroma has been building a more comprehensive portfolio of solutions to better serve the textile industry. Therefore, when we were presented with the unique and exciting opportunity to acquire such a respected and strong peer, we seized it."



Heike van de Kerkhof, CEO, Archroma

Announcing the sale on 9 August 2022, Peter Huntsman said: "Over the past seven months, we have conducted a comprehensive strategic review of our Textile Effects division, including detailed discussions with a wide range of relevant parties. After evaluating several different options and thoroughly reviewing prospective offers for the business, our board of directors decided that SK Capital would be a better owner of the business over the long-term than Huntsman and that the value they offered was in the best interests of our shareholders.

"After closing, Textile Effects will combine with SK Capital's Archroma business to create a world leader in textile chemicals and dyes, with a leadership in sustainability and innovation."

For Archroma, Kerkhof says this is a "merger of equals" where "two committed leaders in sustainable and innovative solutions unite to pave the way towards a more sustainable textile industry."

She continues: "The acquisition of Huntsman Textile Effects adds to the rich historical roots of Huntsman Textile Effects, both of Huntsman and Ciba Specialty Chemicals and blends them with Archroma's strong legacy heritages of Sandoz, Hoechst, Clariant and BASF that have been at the forefront of the textile industry for more than a century."

With the acquisition, Kerkhof notes the combined product portfolios will be highly complementary. "The portfolio of Huntsman Textile Effects is complementary to our portfolio," she says. "Huntsman Textile Effects may have a stronger position in textile dyes and in China, while Archroma has a stronger footprint in textile chemicals and in Europe and the Americas. This complementarity will result in offering fashion brands and the global textile industry the high performance they expect, while respecting natural resources and the planet."

Aggarwal shares this sentiment. He notes: "The merger of Archroma and Textile Effects is transformational, bringing together two highly complementary business and product portfolios together to create a leading specialty textile dyes and chemicals provider. The combined company will be a leader in sustainability and innovation with greater scale to serve customers in every region and market."

Once regulatory approvals are secured and the transaction closes, Aggarwal says that Huntsman Corporation will no longer operate in the textile industry.

On whether Archroma will be keeping Huntsman employees on or merging the companies completely, Kerkhof says: "Our primary goal will be to allow the combined talent pool of Archroma and Huntsman Textile Effects to help us grow the business and become the partner of choice for the textile industry. As in many M&A situations, potential synergies will be considered as part of the integration process."

As well as what will happen to Huntsman Textile Effects structurally, it will be interesting to see how the company's current products will evolve under Archroma. For example, will the existing technologies keep their identity or become part of Archroma's branded offering? For now, Kerkhof says it is too early to know.

She explains: "We have only just announced our decision to acquire. That said, we will want to keep the best of both worlds. As mentioned, our respective portfolios are very complementary and so is the variety of fibres and processes that we will cover. Together we will eventually be able to offer a unique portfolio of innovative and sustainable dyestuffs and chemicals for every need from fibre to finish."

Looking at potential growth for the business going forward, Kerkhof has corporate social responsibility (CSR) in mind. She says that the Archroma team "will need to define what growth means as we also want to be part of the solution when it comes to creating a more sustainable textile industry.This means starting to question how and where we can grow the combined business sustainably."

Future growth

The demand for increased sustainability is putting textile and fashion brands under tremendous pressure to change the status quo. Kerkhof says: "The pressure comes from regulatory authorities and, increasingly, from the general public who are starting to see that climate change may have very real consequences in our daily lives."

She continues that many brands have started to realise that a sustainable collection "now and then" will soon no longer be enough to appease increasingly environmentally conscious consumers. She says: "They [the brands] turn to the handful of textile chemical partners who can help them with innovative and sustainable performance and innovation. That is where responsible textile chemical companies like Archroma and Huntsman Textile Effects have a role to play and future to grow."

Aligning with this, Aggarwal also sees the future of the chemical and dye industry in sustainability. He says: "Sustainability is an increasingly important driver in the textile market, despite headwinds. Mills and brands today are looking for ways to reduce their environmental impact while also capturing market share and improving their bottom line."

He continues: "We believe the textile dyes and chemicals industry has a massive role to play in making this possible as markets become even more regulated and competitive. Consumers increasingly choose products that both perform well and protect the planet."

As part of this growth, Kerkhof believes that the ongoing consolidation of the industry will continue. The market is a difficult one to navigate at present with so many challenges and pressures at play. Kerkhof says that these challenges, such as the energy crisis, pricing pressures and supply chain/logistical challenges come on top of an already unprecedented situation because of the Covid-19 pandemic.

> "THE MERGER OF ARCHROMA AND [HUNTSMAN] TEXTILE EFFECTS IS TRANSFORMATIONAL, BRINGING TWO HIGHLY COMPLEMENTARY BUSINESS AND PRODUCT PORTFOLIOS TOGETHER TO CREATE A LEADING SPECIALTY TEXTILE DYES AND CHEMICALS PROVIDER,"
>
> ROHIT AGGARWAL, PRESIDENT, HUNTSMAN TEXTILE EFFECTS

She notes: "We have been facing wave after wave of challenges for the past three years. We have certainly learned to adapt with measures such as working with alternative supply sources and continuing our existing programs that aim to reduce resource consumption or maximise operational efficiency and productivity."

This, she adds, helps Archroma to mitigate against the impacts of supply challenges and limit its price increases to "what is strictly necessary and fair".

As for the future, Kerkhof is filled with optimism for the textile chemical and dye industry. She says: "We profit from two major megatrends in the textile industry: one is population growth in general and the second one is the growing middle-class everywhere in the world (from 3bn in 2015 to an expected 5.3bn in 2030)."

She concludes: "I think the regulatory pressure, evolving consumer expectations and the supply and climate challenges will force us all in the industry to rethink our business approach and objectives. We want to be profitable, obviously, but we will only be able to do so if we find a way to provide the technologies and ingredients that are safe and sustainable for the planet and future generations."

MANUFACTURERS ASSESS INVESTMENT IN DIGITALISATION

By **Erum Zaidi** & **Raihana Sayeeda Kamal**

The benefits of investing in sophisticated machinery and software may be undeniable to knitwear manufacturers, but when an industry can call on a large pool of cheap human labour, companies need to see clear financial benefits from acquiring such tech. This dilemma is notably stark in south Asia's textile and clothing outsourcing centres, where labour can be particularly low cost.

Pakistan is a case in point. The country's knitwear industry is often urged by its government and sector associations to spend more on technology and innovation to enhance productivity and become more competitive. But companies are often reluctant to run fully-automated operations because labour is cheap and new tech requires better paid and trained staff.

And livelihoods depend on employing humans rather than machines. The Pakistan Hosiery Manufacturers and Exporters Association (PHMA) stresses that its industry consists of 3,500 major, medium-sized and small businesses and employs 700,000 people.

These companies are under increasing pressure to digitise. Navid Fazil, CEO of Interloop, a major socks and hosiery maker, explains: "A good practice model in theory does exist. It starts with digital product development, use of digital twins for optimising bulk manufacturing, an optimised AI (artificial intelligence) based digital supply chain and integrated ERP (enterprise resource planning) systems supported by manufacturing engineering systems on the production floor."

> "Automation will not cut human labour jobs. We always have alternative options for human labour,"
>
> Mohammad Hatem, first vice president, BKMEA

Fazil continues: "These are some of the focus areas within Interloop's digital transformation journey with the aim to drive efficiencies and move from reactive to predictive solutions for quick decision making."

He says: "We are currently working on two use cases, predictive costing and product development. However, he underlines that a "key

challenge has been finding a data science skills base in Pakistan" to operate these new systems. "Like any industry, digital is a journey for the textile industry, which has traditionally not been very high tech." However, Fazil is aware that the international market is shifting, with consumers and buyers making demands on material traceability and environmental impacts.

Interloop diversified into knitwear in 2019 and its current plant is fully vertical with a capacity of 22 million pieces. The company is adding a new plant with a 25 million piece annual capacity, designed according to the LEED Platinum (Leadership in Energy and Environmental Design) eco-building principles. It is expected to be operational in the first half of 2023, with a projected efficient and green plant employing more than 10,000 people.

Fazil believes that, when investing in manufacturing automation, companies will want to see payback within three years – although as wages rise, the attractiveness of automation will grow. The company also has an automation wing, developing in-house tech solutions.

Salim Parekh, the chief executive of Al-Abbas Fabrics, a Karachi-based mill that processes and exports knitted fabrics, is another company closely monitoring tech investment cost benefits. He says: "In terms of modernisation, we are on par with regard to processing and printing but lag behind in the sewing sector simply because labour is so inexpensive."

Dyeing and finishing machinery has been a key priority, he adds. Knitwear producers need to invest in sample rooms too, where creative concepts are translated from drawings to physical products, with digital printing helping to secure client approval. Of course, another factor to consider is energy costs, he says, stressing again that a balance is needed. He adds: "Keeping utility costs in mind is important to become hi-tech in processing and printing while simultaneously taking advantage of a vast labour force."

Economies of scale matter too when making investment decisions, especially for upstream manufacturers. The country's larger textile groups have made investments in sustainable technologies/machinery for production, under pressure from international customers.

However, it is difficult for the middle and smaller companies to follow suit, according to Dr Hassan Rauf, an assistant professor at Suleman Dawood School of Business, Lahore University of Management Sciences. The same is true for wastewater treatment facilities, where investments are being made by larger mills – boosting their environmental credentials and as a result, sales.

> "Maintaining employee happiness at work is essential to raising standards. If we can't provide the quality, international clients won't come to us - instead, they'll go to Bangladesh,"
>
> Hassan Rauf, assistant professor, Suleman Dawood School of Business, Lahore University of Management Sciences

Rauf stresses that these companies also have to invest more in quality labour to operate their systems: "Maintaining employee happiness at work is essential to raising standards. If we can't provide the quality, international clients won't come to us - instead, they'll go to Bangladesh." He highlights Style Textile, based in Lahore, whose enlightened HR policies have helped it recruit significantly better labour and managers.

As is often the case in Pakistan, the industry is unhappy with the level of support offered by its government regarding modernisation. Muhammad Jawed Bilwani, chairman of the Pakistan Apparel Forum and chief coordinator for the PHMA, says some export industries have relocated to other countries because of subsidy and tax support offered by their governments. He gave examples that include Jordan, Egypt and Bangladesh and even higher wage countries such as the US and the United Arab Emirates (UAE). According to Bilwani, Pakistani industrialists are suffering because Pakistan government textile and clothing policy initiatives have not been implemented. Meanwhile, power and gas supply disruptions, long wait times for tax refunds and rising production costs remain a problem. He also supported a balanced approach on technology. Bilwani says: "Advanced machinery and equipment

are a touchstone for success, but the industry cannot solely depend on automation and advanced technology - skilled and productive human resource is also important."

By contrast, Bangladesh manufacturers are keener to voice support for the value of technological investment, despite this country also retaining a large pool of cheap labour.

Mohammad Hatem, first vice-president of Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA), says that his country's knitwear companies are keenly interested in investing in high-tech digital equipment and software, regularly attending trade fairs on digital equipment. He says: "The Bangladesh knitwear industry is always ready to adopt new technologies to have a competitive edge in the global market."

This is especially the case for high-end knitwear companies, as without tech upgrades, complicated design, fitting and cutting are not possible, he says. The BKMEA organises skill development training for workers to operate high-tech equipment as a result. Hatem continues: "Automation will not cut human labour jobs. We always have alternative options for human labour. We have automated our cutting, laying and sewing etc, but still, we have a 15% manpower [shortage] crisis. Only high-end production requires high-tech equipment; for basic production we will still rely on human labour."

Indeed, Bangladesh labour costs are so low, lay-offs themselves are not a major cost saving, says Fazlee Shamim Ehsan, the BKMEA's second vice-president. He says: "Our main purpose is to reduce waste and increase production, and digital technology can help achieve that goal." The problem of concern for Bangladesh executives eyeing digitisation are not labour cost issues, but bureaucratic inefficiency at the National Board of Revenue (NBR) and Bangladesh Customs. Ehsan, who is also owner of Fatullah Apparels, a high-end knitwear factory that produces sportswear, says: "There are some HS [tariff] codes for each piece of equipment to get cleared from the customs office. I had to change the HS code four times to import one piece of equipment. Since it was new equipment, customs did not have a specific HS code for that. It took me a while to get it cleared from customs."

Hatem notes that many factories face such problems. Such delays may increase freight costs by around 40-50%, forcing manufacturers to give discounts to buyers for the delay or risk order cancellations.

Eshan hopes technology will make up time through faster production. Fatullah Apparels exports higher end products such as official Real Madrid football jerseys, Spalding basketball jerseys, yoga pants and cycle shorts. As a result, the company is automating its work reporting system. Ehsan says: "This will give us hourly real-time updates. We can motivate the slow workers to speed up."

Hatem, meanwhile, has asked government policymakers to remove all duties on equipment and parts imports: "The bureaucratic web of complexities and high tax of around 40-50% on equipment parts creates hassle and many pieces of equipment go dysfunctional without parts. The more we can import high-tech equipment, the more production we will have, the more jobs we can create and the more foreign currency we can contribute to the country."

Other Bangladesh factories making investments include Fakir Fashion, Knit Fashion and the Ananta Group, all of whom have recently invested in high-tech equipment for producing high-end knit items including sweaters, activewear, knitted polo shirts, as well as basics such as knitted T-shirts.

The Bangladesh knitwear industry is also under pressure to invest in technology through shifting to producing recycled, eco-friendly fabrics to create a competitive edge to satisfy global brands' sustainability requirements. As a result, factories are investing in creative and innovative technologies to beautify knit items with minimal environmental impact, such as digital printing and glossy foil prints, as well as knit washes, seamless knitting and finishing.

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ROTARY PRINTING ZIMMER 1998, 14 colour, blanket 2.200 mm, 5 section gas dryer, INVERTER, machine with 16 colour frame
DIGITAL PRINTER ZIMMER COLARIS 2600, year 2012, 2.800 mm, housing
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Using seaweed to create pigments

Cara Dudgeon speaks to Scottish company, Crùbag, about creating pigments from seaweed, circular supply chains and the importance of collaboration

Jessica Giannotti, founder of Crùbag, started the company in 2013 after graduating in marine science at the Scottish Association for Marine Science (SAMS).

She says: "I was really inspired by the beauty and access that I had, it was a privilege. I wanted to share that beauty and knowledge of the ocean." However, she admits she didn't know how to go about starting a company, so collaboration was key.

She says: "We started with the design – it was about creating a beautiful textile collection in collaboration with marine scientists. We start with a theme and then pair that with ocean literacy."

For Giannotti, communicating how the design has been enhanced by science is extremely important as she claims that "it's part of our identity."

The science

Crùbag explores the use of seaweed as a sustainable feedstock for natural dye production. Giannotti cannot reveal the entire extraction process, but reveals it is solvent free and has no additional elements.

She says: "The application on textiles has had really interesting results. So, we created a good baseline, but realised the dyes we had developed early in our project were great but not viable. The light fastness just wasn't there."

Thankfully, the second batch the company created had better results. Giannotti is currently testing various batches of dyes on different natural fibres, such as cotton with silk and Merino wool.

She says: "I washed some of the fabric after [dyeing] with cold water, and some with warm water and delicate soap and there was no runoff and the colour stayed on both.

"We've also exposed the fabrics to sunlight for three days and the colours didn't degrade, which is amazing. Especially as they are protein-based pigments which are very delicate."

According to Giannotti, the company needs to repeat the results and then test in lab settings to measure the lightfastness and other properties. After this, it hopes to scale and prove the concept before developing for industry-scale.

Dye intensity

Natural dyes have a reputation for being muted, pastel shades but Crùbag's dyes have a vibrancy that lends itself to apparel.

Giannotti says: "They're surprisingly quite bright and pink – they're almost that kind of candy pink – which is amazing, because that's a very hard colour to get from nature."

Depending on how the company extracts the dyes, it can get various shades of reds, purples and pinks. The company is aware that whenever you dye a fabric, you will never truly get the same brightness but that's what makes each of Crùbag's items unique.



Giannotti says Crùbag's dyes are surprisingly bright and almost candy pink which is difficult to achieve from nature

Starting with scarves

Currently, the company only has scarves in its garment inventory. A purposeful decision, Giannotti says: "We started with scarves because people like them; they're less likely to be a throwaway, fast-fashion product.

"So, we consciously decided to operate at a sustainable luxury level because we wanted to make products that were beautiful, but also thoughtful and responsible."

As happy as the company is to focus on scarves, Giannotti says it does hope it expand into more products, such as silk shirts or bags, but insists they must keep within the sustainability ethos of Crùbag.

She says: "Yes, it's about growth but also about the story and why we're doing what we do. We need to be careful that we don't prefer economic growth to social and environmental sustainability."

Sustainability

Sustainability is becoming increasingly essential to the textile & apparel industry, but Giannotti warns we need to ensure it isn't just a buzzword.

She says: "I think it is important that we are very clear about the aims of our project – it has to be sustainable. But we need to define sustainability because it's becoming a buzzword.

"If we can work in a way that's thoughtful and respectful to people and the environment, we have a good chance to create beautiful, sustainable and useful products for the industry."

Regarding the United Nation's (UN) Sustainable Development Goals (SDGs), Giannotti is unsure if they will be met before 2030 but says we need to remain positive and optimistic.

She says: "The climate crisis is happening now. Not in 10 years, or five years; it's happening now and we need to act.

"The SDGs are a great way to guide us but there are so many; we need to pick and choose which we want to focus on because 2030 isn't far away. We might not reach them by 2030 but we could make good progress."

Giannotti says that by understanding where a company's aims fit within the UN's SDGs, they can then adjust any future plans, so they benefit the planet, the people and the economy.

Scalability

As important as sustainability is, the aim of a company is to grow and make a profit. However, sustainability and scalability don't necessarily go hand-in-hand.

Giannotti says: "I think it's about being thoughtful and understanding the industry and the target markets. And it's about scaling in a way that respects the boundaries of nature and the availability of skills and materials."

The company is passionate about using Scottish materials but if the supply isn't there for the demand, it might need to branch out into different sources for its dyes.

Giannotti says Crùbag uses a local algae species that can be cultivated and become more of a crop. By doing this, the company doesn't need to take large quantities and can be extracted without causing harm to the ecosystems.

Collaboration

Crùbag started with collaboration and the practise is still important to the company. Giannotti says: "I'm a big fan of collaboration and combining with other industries. I think it will help the industry become more sustainable."

According to Giannotti, every company has their own strength, so by collaborating we can use each other's knowledge to find solutions.

She says: "I think if we combine positive trade and innovation with collaboration, we can transfer knowledge laterally – we don't have to keep reinventing the wheel. If you combine creativity with science, that's where you innovate."

However, she insists that we must trust each other and establish positive relationships to create the change that is needed.

She adds: "If we understand what we can do from a local perspective, and the materials we can use, I think we can use more bespoke solutions based on the industry, companies and our products.

"It's not about finding one answer, I think it's important to find a multitude of solutions that are mindful and diverse."

Future plans

As previously mentioned, Crùbag hopes to have a bigger range of products in the future, but that's not all.

Giannotti says: "The dream is to create a more circular model with algae to contribute to the development of the seaweed industry and a thriving economy here in Scotland."

She says the company wants to see what else it can use the biomass it's using for extracting pigments for. A look into the potentials of producing yarn, bioplastics or other materials with a focus on the textile and fashion industry is also important to Crùbag.

Giannotti adds the company also wants to understand the life cycle of products and the capacity for capturing carbon.

Thermoregulating clothing: A democratic solution to climate change

By **Jessica Owen**

In this episode of The WTiN Podcast, we talk to Scott Mellin, CEO of LifeLabs.

LifeLabs is a materials science company founded by Professor Yi Cui, director of Stanford University's advanced materials laboratory, and Meng Sui, a chemist and CEO of clean-energy foundry EEnotech. The company has developed textile technologies to reduce energy consumption with the aim to shift the way that we think about fabric and its environmental impact.

In this podcast, Mellin talks about the company's two thermoregulating technologies – WarmLife and CoolLife – which he describes as a democratic solution to climate change. In fact, Mellin says that wearing these products 365 days per year can help one person to save 1,000 lbs of carbon in that time. Elsewhere, he talks about LifeLabs's holistic approach to sustainability, his opinion on the Higg MSI and how the company's technology could be applied to automotive, upholstery and sportswear in the future.



Utilising graphene to clean wastewater

By **Sarah Gibbons**

Researchers have created an eco-friendly graphene-based nanofilter to remove dyes from textile wastewater, prompting scientists to claim another important industrial use for what has been dubbed a super material.

In the finishing segment, specialists have argued the filter could be a game changer for an industry facing increasing regulatory pressures and sustainability market demands.

The filter has been developed by an international team from the University of Seoul, in South Korea; the Peoples' Friendship University of Russia (RUDN), in Moscow; Amity University, Haryana, India; and the Graphic Era Educational Society (GEES), Dehradun, Uttarakhand, also in India. They developed a composite capable, they claim, of removing up to 100% of harmful compounds from water.

In tests, the nanofilter proved it could be used seven times without losing effectiveness, adding to its sustainability credentials. Other water purification methods using adsorbent techniques are typically disposable and their efficacy is phased in slowly.

Here, this team's system proved effective within an hour of starting work on contaminated water, according to their research paper published in the Journal of Environmental Chemical Engineering last October (2021).

The research paper states: "The presence of anionic and cationic dyes in wastewater has highlighted a great necessity to develop new and effective approaches for their simultaneous removal."

Professor Rahul R Nair, professor of materials physics at the National Graphene Institute, based at the University of Manchester, UK, says: "Regulatory changes are forcing the textile industry to find solutions to the problems it creates.

"New regulations are getting tougher because we know the impact of these contaminants causing different health issues. Regulatory authorities need the textile industry to come up with more techniques.

"With its lack of toxins, carbon-based graphene is a game changer for many sectors," Nair continues. "There are innovative ideas and products all the time because of its properties."

Graphene is a one-atom-thick, two-dimensional carbon material. According to the graphene research platform, Graphene Council, the material has high electrical and thermal conductivity, is strong, has a high surface area and is lightweight. Pure graphene is hydrophilic but, when it is exposed to air, a thin layer of hydrocarbon (a compound made entirely of hydrogen and carbon) contaminates its surface and makes it hydrophobic.

In the Russia, South Korea and India project, a graphene oxide-manganese dioxide (GO-MnO2) nanocomposite was created and demonstrated as an adsorbent (whereby contaminant molecules attach themselves to the graphene) for the removal of cationic dye methylene blue and anionic methyl orange from an aqueous solution.

RUDN professor Vinod Kumar told the Graphene Council: "Throughout the world, the discharging of excess organic dyes from different industries such as textiles have caused great damage to human health and aquatic systems. These different organic dyes are non-degradable and create carcinogenic, breathing, vomiting, eye burns, diarrhoea and nausea in human beings."

His team's solution, he says, is fast and environmentally friendly, working in temperatures of 120°C. To test its effectiveness, scientists dissolved methyl orange and methylene blue in water – 50mg of adsorbent was placed in 50ml of solution with an initial contaminant concentration of 150mg per litre. Chemists measured the level of water contamination over a period of five hours.

The adsorbent successfully removed 50.48% of methyl orange and 85.35% of methylene blue after just five minutes of action, Kumar and his team noted. After an hour, there were almost no pollutants left in the water; the complex absorbed between 94% and 100% of the dyes. One gram of adsorbent was able to hold 149mg of methyl orange and 178mg of methylene blue.

The efficiency of removing the pollutants did not fall below 90% even after seven cycles of use, the team reports, describing the feature as good reusability.

Kumar says: "From these results, it can be assumed that the synthesised adsorbent can be used to purify the water by filtration. By considering the low cost and higher adsorption potential, GO-MnO2 nanocomposite will become a promising candidate for simultaneous removal of cationic and anionic dyes from polluted water for water purification."

The research paper concludes that the results give a direct visual impression of the fast kinetics efficiency and high adsorption capacity for real wastewater treatment application.

But Nair, whose own team is currently working on graphene-based nanofilter membranes for desalination, warned the GO-MnO2 project needs more work to show its validity. He says: "You never have this contaminant alone in water so they need to check if the technique will work in the real world. New developments always work in the lab, but the big challenge is in reality. Then you can modify the technique. But this is a first step for adsorption for this industry using graphene."

Dr Manuela Melucci, a material scientist from Consiglio Nazionale delle Ricerche's Institute of Organic Synthesis and Photoreactivity (CNR-ISOF), in Bologna, Italy, says a benefit of using 2D graphene products in water purification solutions is that its chemistry can be tailored to make it specific for adsorption. It can be used in powder or sheet form, or to make more complex composites combining it with polymers.

Research jointly published in 2020 by Melucci states that core-shell graphene oxide-polymer hollow fibres were

developed and used to remove several contaminants from water, including perfluorinated compounds (PFCs), metals and dyes.

She says: "The textile industry uses dyes and additives that could be removed by graphene – there are several modalities to exploit. It's a multi-functional material and the industry can definitely benefit from graphene uses."

Describing how graphene sheets can be used in filtration systems, she adds: "When molecules see the possibility of attaching to graphene sheets, they prefer to stay on those sheets."

Graphene sheets (perforated with miniature holes) are studied as a method of water filtration. They can let water molecules pass, but they block the passage of contaminants and substances.

Melucci is currently undertaking a project to develop electro-chemical sensors for the detection of contaminants in water.

Nair describes the two methods of removing pollutants from water as direct filtration – making a membrane – and adsorption, attracting and absorbing organic dye material.

He said: "Filtration is very good when the contaminant is concentrated – very high levels like salination. But if you have a smaller amount, adsorption is the better technique.

"Graphene enhances filtration or separation capabilities," says Nair.

Explaining the timescales for commercialisation of any new purification system, Nair believes it takes around 10 years – if a project runs smoothly - from research concept to appearance on the market.

Nair adds: "You have to make it effective and also cost effective – that's very important for the final use."

New material for sustainable-based garments

By **Cara Dudgeon**

Sportswear giant Nike Inc has launched Nike Forward. The company says the innovation moves away from traditional knit and woven processes, by hacking punch-needle machines for the purpose of making sustainability-minded products.

Carmen Zolman, vice president of innovation apparel design at Nike, says: "Nike Forward feels different because it is different. It is not a traditional knit or woven, but a completely new material that drastically reduces its carbon footprint."

According to the company, over five years of research went into the development of Nike Forward. Rather than following a multistage creation cycle – spin yarn, knit, cut, sew and more – the company says Nike Forward turns fibre directly to textile through needle-punch.

Nike adds, fewer steps means less energy consumption, contributing to an average of 75% reduction in the carbon footprint for this first-generation material compared to traditional knit fleece.

The Nike Forward material also has a lighter density than traditional knit fleece, according to the company, which is crucial to reaching 75% carbon reduction, and the finished product is comprised of 70% recycled content by weight.

The company says the first iteration of Nike Forward products are made without zippers, aglets or extra trims, therefore making it easier for the garments to be recycled.

Seana Hannah, vice president of sustainable innovation at Nike, says: "As part of our commitment to serve athletes by offering more sustainable options and meeting our science-based impact targets, we're introducing a material innovation that can be adapted to different lifestyle and performance purposes."

According to the company, Nike Forward can be made with a diverse range of layers, including industrial and post-consumer waste and can be precisely tuned for athlete needs.



In keeping with its sustainable ethos, Nike says the hoodie forgoes embellishments and dyes, favouring raw cut pockets and zero water usage. Image credit: Nike

Aaron Heiser, vice president of global apparel product merchandising at Nike, says: "We believe this platform has the potential to reset the way we think about material and apparel.

"This is the biggest Nike apparel innovation since Dri-Fit 30 years ago and has huge potential to transform the industry in the way that Air and Flyknit did for Nike footwear."

Devotion to a greener future

By **Daniel Inauen**, head of product management dyestuffs CHT Switzerland AG and **Birgit Holz**, head of business unit textile auxiliaries, CHT Germany GmbH

CHT Group, a chemicals company with global operations, supplies high-quality process and performance chemicals such as dyes, auxiliaries and pigments for the textile industry. It works together with non-profit organisation Cradle to Cradle Products Innovation Institute, which focuses on sustainability and recycling. The ultimate goal of this partnership is to enable the recyclability (technical cycle) or composting (biological cycle) of textile items at the end of their product life, thereby reducing the negative impact of textile production on people and the environment.

Sustainable frontrunner

Ever since CHT's founding, sustainability is one of the crucial values that underpins the company's innovative power, it claims. It determines the daily work and the business' strategy. As an innovative and sustainable partner of the textile industry, CHT Group



is always working on tomorrow's ideas and solutions, the company adds. Thus, in the meantime, 200 textile dyes and auxiliaries of CHT have been awarded with a C2C Certified Material Health Certificate and thereby support the achievement of Cradle to Cradle Certified for end products. CHT Group says it offers the largest certified chemical product range in the textile sector among product families such as BEZAKTIV, BEMACRON, FELOSAN, MEROPAN, RAPDIOPRINT, ARRISTAN, TUBINGAL and many more. Customers around the world appreciate this, as well as the effort of CHT to regularly extend the assortments, the company claims.

Global view of the circular economy

The Cradle to Cradle Certified Product Standard is based on the latest research and development findings. It also incorporates scientific aspects and takes current technical developments and industrial trends into account. Cradle-to-Cradle certification requires the prior assessment of an end product in five categories: Material Health, Product Circularity, Clean Air & Climate Protection, Water & Soil Stewardship as well as Social Fairness.

By offering a comprehensive range of textiles auxiliaries, dyes and pigments that have received a C2C Certified Material Health Certificate, CHT covers the entire textile value chain and allows customers to produce their textile articles with sustainable chemistry. The large assortment includes certified products for pretreatment (20 certified products), dyeing auxiliaries (30), reactive dyes (22), disperse and acid dyes (> 10), printing auxiliaries (40), pigment dispersions (9), finishing and coating auxiliaries (33), and jeans and garment finishing products (23).



Circular economy in the textile industry

An opportunity for the textile industry

Cradle to Cradle certification not only promotes more environmentally friendly textile production, but it also enables brands and finishers to stand out from the crowd of global competitors. In this way, Cradle to Cradle certification allows companies to guarantee the recyclability of their products from the beginning to the end of their production cycles and to substantiate their ecological claim.

CHT Group assists customers around the world in making their individual contribution to sustainable and ecological textiles. In all processes along the textile value chain, CHT Group has gained excellent experience and know-how over many years, it claims, which it applies every day throughout the world.

For more information, visit www.cht.com.



CHT Group says it offers the largest certified chemical product range in the textile sector

Driving change through sustainable chemistry index

Bluesign and Sustainable Chemistry for the Textile Industry (SCTI) are developing a sustainable chemistry index that will provide a standard communication guide for chemical suppliers, manufacturers brands and non-governmental organisations.

The index is intended to change the industry by making it easier for stakeholders to assess the sustainability of textile chemical products against the highest standards, while safeguarding the intellectual property (IP) of participating chemical companies.

SCTI is an alliance of leading chemical companies that aim for textile and leather industries to apply sustainable chemistry solutions to protect factory workers, communities, consumers and the environment.

IP protection is critical to ensuring ongoing investment in sustainable solutions, according to Bluesign.

Wolfgang Anton Schumann, SCTI chairman, says: "Through its independent position, Bluesign has earned the industry's trust to provide sustainable chemical solutions and impact reductions across the supply chain for the past two decades."

Bluesign will implement and manage the sustainable chemistry index as an independent authority with a holistic approach to help companies throughout the textile supply chain improve their sustainability performance.

Daniel Rüfenacht, Bluesign CEO, says: "SCTI offers deep sustainability knowledge in the chemical industry.

"The new sustainable chemistry index will help the industry progress beyond current regulations and realize the EU Chemicals Strategy for Sustainability by providing textile chemical users a clear rating on a substance's environmental and social impact to advance decision-making."

Chemical products such as dyes and textile auxiliaries are often characterised with the attribute of "free of a certain substance". Rather than prioritising ingredients only, the Bluesign system already goes beyond this, according to the company.

The chemicals and the production site where they were created must meet certain criteria regarding environmental performance, occupational health and safety and product stewardship performance to be Bluesign approved.

The sustainable chemistry index will be reserved for substances that offer transparency on a number of additional indicators including the chemical's circularity viability, greenhouse gas emissions during production and the source of the raw materials.

The sustainable chemistry index will also require that the downstream use of the chemical is optimised, meaning, for example, that it promotes resource saving in textile finishing.

Additionally, corporate governance paired with well-defined environmental and social (ESG) goals will be a pre-condition. The mission for the joint partnership between Bluesign and SCTI and the sustainable chemistry index in particular is to drive change.

Fabian Walda, research & development at Bluesign ACADEMY, tells *International Dyer & Finisher* that the company strives not only to remediate or minimise the negative impacts of chemical product, but to look at the whole life cycle and improve the positive impacts on the planet and protection of human rights.

He says: "Sustainable chemicals are fit for circular economy, encourage the use of sustainable feedstocks, improve the resource efficiency in downstream applications and contribute to the longevity of consumer products."

Walda adds that although the textile & apparel industry has made a lot of good progress in recent years, companies now need go beyond current regulations and voluntary standards.

He says: "The sustainable chemical index will provide brands, retailers and their manufacturing partners with a professional science-based search engine to make more informed decisions regarding the selection of sustainable chemicals."

When the system eventually integrates all information in the textile value chain, consumers will ultimately benefit from awareness about the impact of a garment they purchase, according to Bluesign.

Walda adds: "This is the long-term goal and it is a journey towards which we are working. We are in the preliminary stages of the development process."

New finishing tech rids need for water connection

Two companies in the textile finishing and printing realms have come together to create ISOeasy. **Ruby Penson** speaks to **Martina Giorgetti**, marketing manager at Cibitex, to find out more about this innovative technology

Italian textile finishing company Cibitex and ink and printing equipment reselling company Isotex have collaborated on a new partnership named ISOeasy — a solution that allows for the transition to direct digital printing without industrial stream or water connections in a 100 sqm space.

Martina Giorgetti, marketing manager at Cibitex, says the innovation was developed to help people and communities who want to enter or invest in the digital textile printing business without the need for large spaces.

She adds: "It started two months ago, when our partner was looking for compact pre- and post-treatment equipment with low energy consumption. ISO Group contacted us, and we knew the potential.

"Thanks to Christiano Manenti, the president and founder of ISO Group, the project took just a few weeks to start. All the machines are developed to reduce the consumption of water as it's a known problem in the textile industry."

Giorgetti says that both Cibitex and Isotex care about sustainability and providing customers with something they are happy with. The technology uses less water and power to obtain the same results on the fabric compared to more conventional ways.

Thanks to the new innovations, a digital textile printer can be installed in a space like an office in residential areas. Cibitex wants to make it possible to do the same with other related equipment, aiming to look beyond traditional concepts.

She says the collaboration between the companies will benefit printing houses with the reduction of outsourcing costs and consequently the reduction of transport pollution. More importantly, it will allow for complete control over the entire process.

Giorgetti adds: "It's not just a matter of sustainability. It's connected to the strong belief that we can challenge the old idea of the textile world by developing and building advanced units. This would enable customers to have an easy experience, to reduce energy, pollution and materials consumption, and completely forget about maintenance."

In terms of performance, Giorgetti says that the wash-fastness and colour-fastness of the textiles can yield good results, so long as the right combination of chemicals combined with innovative processes are used.

She says: "Take for example, pigment ink. The ink fixation, or polymerisation, is better if done by direct contact of the fabric with a hot surface compared to hot air. The more accurate the curing temperature, the more fixed the ink is.

"With our technology, there's a double contact process on the back and on the front. The temperature is adjustable on each cylinder to perfect the control. It is also possible to add a specific chemical bath to increase the solidity result with the same machine."

Giorgetti understands it may be something that sounds complicated to users initially, however, Cibitex offers technical and consulting support to train users about the correct processes.

The technology covers pre- and post-treatments for all types of inks, depending on the process application to the fabric, according to the company. Giorgetti says it works with natural, mixed, man-made and synthetic fibres – with tests being held on a wide range of fabrics, from 18 gsm silk to 500 gsm velvet.

Each type of ink chemistry involves different processes to prepare and finish the fabric correctly. Giorgetti says that with the new technology, it's possible to cover most of these processes for every type of ink.

She adds: "For example, the easyCOAT/DRY was specifically designed for digital textile printing with pigment. easySTEAM has unbelievable results with acids and reactive inks thanks to the saturated steam in it. We have customers that use easyWASH for nylon flags. It's a really versatile system."

With the exception of easySTEAM, each machine is controlled by a touchscreen tablet interface. Each unit has its own software where it's possible to save presets.

Giorgetti says it's possible with ISOeasy to cover a production of up to 300 m/h (based on 120 gsm cotton fabric), depending on the fabric. She adds: "It has been designed from the start to be a modular system. If a customer wants to increase production, units can be added."

Nanophotonic coating aids thermal management

By **Cara Dudgeon**

A visibly transparent and infrared reflective coating for textiles has been devised by researchers from the University of Illinois Urbana-Champaign, based in the US.

Designed with a nano-mesh structure, the coating transmits visible light – including sunlight – and reflects body thermal radiation like conventional metal-based textiles, according to Professor Lili Cai and her team.

Previous studies have shown that when materials, which reflect radiation from the body are worn, the wearer's body temperature increases.

However, most of these materials are metal with a distinctive colour, making it challenging to use textiles in other colours. Additionally, they reflect most solar light, which makes the absorption of sunlight for outside warming difficult.

Cai and her team were able to utilise various colours of textile to achieve a warming effect without energy consumption.

In addition, by combining the nano-pore structure with a photothermal material, the researchers were able to confine both sunlight and thermal energy from the body inside the textile.

Even in freezing weather, the coating achieves a 15°C (59°F) higher heating effect than commercial clothing. This could allow more outdoor activity during the winter months without the need for bulky clothing.

However, researchers say applications for this technology go beyond personal heat management. The reflective coating can be used in counter-surveillance military applications – specifically, to provide camouflage under the scrutiny of thermal imaging cameras.

Their tests of the thermal camouflage effect, at temperatures ranging from 34° to 250°C (93° to 482°F) proved promising that it could successfully be used for both day and night cloaking.

Spray technology alternative avoids skin contact

By **Cara Dudgeon**

Pincroft Dyeing and Printing has adopted a precision spray technology that allows the application of many finishes to the face of the fabric to avoid contact with the skin.

Based in Lancashire, UK, the company says the system is a more versatile and environmentally friendly alternative to the traditional application method of padding.

It adds the technology offers the possibility of applying the chemistry on either face side or both sides of the fabric across full width.

Mike Collins, managing director at Pincroft, says: "This innovative equipment can be used in two ways.

"The single sided spray finishing can be used where the full effectiveness of the finish is only required on the face side of the end item, for example, vector, fluorocarbon and antimicrobial protection.

"The dual spray finish may be used to simulate the

traditional padding method where full effectiveness of the finish is required dependant on end use, for instance, crease recovery, fabric softening, soil release and moisture management."

The new equipment gives benefits to the end user but also the environments. The system allows for a reduction of energy, water and wet pick up of up to 50%, while 100% of the chemistry is recycled, according to the company.

Due to the precision application technology, less water and chemistry are needed overall. Plus, the company says its no immersion system means the fabric would require less saturation and a shorter drying time.

According to Pincroft, the new precision spray technology helps end users as it solves issues linked to the use of permethrin, an insecticide for vector protection in contact with skin. It is a common occurrence in soldiers who require protection against mosquitos, ticks and other insects during combat.

The vector protection solution provided by Pincroft is ACTIGARD, a branded technology developed by Sanitized AG.

According to the company, it has long lasting ingredients that have proved highly effective against mosquitoes and ticks and endures a high number of washes.

It is suitable for military uniforms and conforms to Standard 100 by Oeko-Tex.

Aprons capturing carbon

In this episode of WTiN's Textile Innovation Podcast, host **Ruby Penson** talks to **Edwin Keh**, CEO at the Hong Kong Research Institute of Textiles and Apparel (HKRITA)

The institute is funded by the Innovation and Technology Commission of the HKSAR government and hosted by The Hong Kong Polytechnic University. It is an applied research centre for the textile, apparel and fashion industries and says its goal is to engage in useful research, explore enhancements and create new values, applications and solutions for the challenges in the marketplace and in society.

In this episode, Ruby Penson, podcast host and digital news editor at WTiN – the publisher of *International Dyer & Finisher* – talks to Keh about Industry 4.0, sustainability and some of the innovations that the institute is working on. For example, the apron made of a material that eats carbon from the air while it's being worn, an extremely absorbent textile that could help farmers and the world's shortest supply chain that could fit into two 40ft containers.

Since being established in 2006, the institute fulfilled its vision of being a leading center of excellence in research, development and technology transfer in the fashion & textile industry. Keh shares a multitude of knowledge and insight with WTiN during the episode. You can listen to the episode above, or via Spotify and Apple Podcasts. You can find out more about HKRITA by heading to hkrita.com.



To listen to the podcast visit www.wtin.com/article/2022/september/19-09-22/ep-88-aprons-capturing-carbon-from-the-ambient/

SDL Atlas introduces Vortex Plus

SDL Atlas has unveiled Vortex Plus, which the company claims allows testing of up to 50 complete wash cycles without an operator present.

SDL Atlas has equipped the Vortex Plus - the same instrument trusted by major manufacturers and retailers in the sportswear and apparel industries for their AATCC wash testing - with an automatic liquid detergent dispenser. The instrument is designed to serve customers who need to simulate the multiple washes that occur in the lifespan of a fabric or garment.

The Vortex Plus holds over two litres of detergent which it can automatically dispense for up to 50 repeated wash cycles without operator intervention, SDL Atlas says. The dosing of detergent through the liquid dispenser is fully programmable by the operator, as are all other aspects of the wash cycle such as bath temperature, water volume, agitation (speed & time), spin (speed & time) and rinse volume.

This new instrument performs all of the same functions of the Vortex M6 and meets AATCC wash testing requirements, SDL Atlas confirms.

The company adds, the Vortex M6 and Vortex Plus are the only commercial-grade, top-loading washing instruments engineered specifically for laboratory use in meeting global testing standards. The instruments provide programmable precision via a user-friendly, multi-language (English, Spanish and Chinese)
full-colour, touch-screen controller that can manage custom cycles with a maximum 100-hour duration. Both the Vortex M6 and Vortex Plus can be calibrated to ISO 17025 requirements and adjusted back into compliance easily by qualified personnel, the company concludes.



The SDL Atlas Vortex Plus

Water penetration focused solution

James Heal has launched HydroView, a hydrostatic head tester which is designed to measure the penetration of water in materials which have an end use that requires water resistance, such as those in the medical, geotextiles and nonwovens sectors. The technology can also be used to test end-use applications for technical textiles.

Lisa Keeling, technical specialist, James Heal, says: "As more and more brands are investing in new materials and making performance claims on water resistance and waterproofing, the hydrostatic head test is one of the most common ways to test.

She explains: "An example of where hydrostatic pressure might be important is in testing the groundsheet of a tent. This needs a high resistance to water penetration, especially when placed on saturated ground. When pressure is applied to the ground sheet by people standing, sitting, or sleeping on it, water could then be forced through. Failure in this area would mean anything in contact with the groundsheet will become wet."

This is also the case with a performance garment claiming waterproof properties. Keeling adds: "You need a high hydrostatic head value to demonstrate its defence-ability against driving wind, rain and other physical factors. Water penetration testing is key to understanding the performance of a garment in adverse weather conditions.

"HydroView was developed following extensive user research from which James Heal's innovation team discovered that users were looking for a more flexible and user friendly instrument than was available on the market. With its manual droplet data-capture, combined with 'pinch & zoom' hi-res camera analysis, HydroView was designed for the user."

Computing partnership amps up healthcare

Textile computing company Myant, based in Toronto, Canada, adds HYDRO_BOT and Steriliser to its Textile Computing Ecosystem to develop further its applications in the healthcare and automotive industries.

Its partnership with Zurich-based developer of HYDRO_BOT and Steriliser technology is set to bring more innovation to the textile computing industry and bring advancements in healthcare active membrane applications of wound care management.

Unlike traditional passive textiles and membranes, the technology provides active electronically driven moisture transport regardless of climatic conditions according to Myant.

It uses a very small electric voltage, using less than one volt for the evaporation process. This is a fraction of the energy usually required.

Early HYDRO_BOT products entered the market towards the end of 2018 after development and testing by Osmotex, other textile industry partners and testers at Salzburg University in Austria and the Swiss Federal Laboratories for Material Science and Technology (EMPA).

While the first applications were in outdoor clothing, the healthcare and medical-related applications are currently under development.

Coupled with the Steriliser technology and its ability to disinfect textiles from within, the textile could keep wounds both dry and clean, according to Myant.

In the future, advanced functions such as controlled release of medication, filtering of bacteria/proteins and monitoring of replacement need for wound dressings can be enabled.

Myant creates textiles that can sense and react to biomarkers and environmental stimuli transforming fabrics into bidirectional interfaces and physiological systems of the body.

The plurality of biomarkers that can be captured via textile computing opens new possibilities for innovation in the field of wound management and care.

Myant says its primary research, development and clinical studies in recent years has been cardiovascular disease monitoring and management through its Textile Computing technologies and the companion virtual clinic for remote patient monitoring (RPM).

The company says its working to decentralise health care services through accessible and digitised interfaces around the users rather than around conventional healthcare facilities. The company had been taking steps into digitalisation long before this development.

New buying and cutting solution

Coats Digital has launched FastReactFabric: a newly amalgamated buying and cutting solution.

The company says the new market offering will enable fashion manufacturers to significantly reduce fabric costs by up to 2.5%; shrink fabric buying and planning times by 95%; and provide 100% fabric tracking, in order to further advance sustainability credentials and reduce overall fabric remnants that so often end up in landfill.

With FastReactFabric, Coats Digital says the apparel industry can reduce the quantity of fabric required, having a positive impact on the environment while boosting profits.

FastReactFabric combines Coats Digital's previous IntelloCut and IntelloBuy solutions into one single platform, according to the company. It adds, it provides a closed-loop, continuous 360-degree feedback ecosystem between buying and cutting operations, meaning fashion manufacturers can accurately procure and utilise fabric effectively.

Akash Shah, managing director at Coats Digital, says: "We listened carefully to what our customers were saying about the fabric challenges they face. We realised that it made perfect sense to amalgamate and enhance our fabric cutting and buying solutions into one comprehensive single platform to eradicate key pain points in one swoop.

"With 70 to 80% of fashion manufacturing outlay attributed to fabric costs, the digitisation of fabric-related processes is the most fundamental way that apparel manufacturers can make a real difference to their profits, as well as reduce the impact of fabric waste on the planet."

He adds: "We are very excited to be launching a comprehensive fabric solution that will prove instrumental in redressing some of the financial damage suffered during the pandemic. Similarly, it will help the apparel industry future-proof against incoming global legislation around waste and sustainability compliance."

FastReactFabric will increase fabric utilisation significantly by automating and optimising the estimation of fabric consumption at the buying stage, according to the company.

Coats Digital adds it will help increase accurate cut

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planning and execution on the production floor, to eliminate time-consuming manual tasks and reduce fabric, water and energy consumption.

Wesley Ekman, senior sales director, Coats Digital, says: "Buying too much fabric is a costly mistake. In such a volatile trading environment, fashion manufacturers simply cannot afford to buy the wrong amount of their largest cost investment if they want to keep up with increasing consumer demand for fashion in a variety of style and colour choices.

"A more streamlined production process using accurate fabric data significantly frees up warehouse and shop floor space, reduces inventory and enables manufacturers to adapt effectively to increasing garment complexities and colourways."

He adds: "We expect our new solution will prove a highly compelling proposition to companies looking for a sure-fire remedy to mitigate rising costs fast. Ultimately, our new solution will deliver much greater value to both new and existing customers alike."

The company adds, FastReactFabric will provide access to accurate data for both operations to ensure manufacturers can make the right decisions about their buying and cutting processes at the same time.



Coats Digital has launched FastReactFabric

Machine targets greener dyeing

Tonello has launched a new generation of its signature washing and dyeing machine, Evolution 3.

The company says its years of research have been towards reducing the water and energy consumption of its machines, as well as increasing productivity and decreasing maintenance costs.

Alice Tonello, the company's marketing and R&D director, says: "The reason we designed and developed Evolution 3 is to bring concrete benefits to our customers.

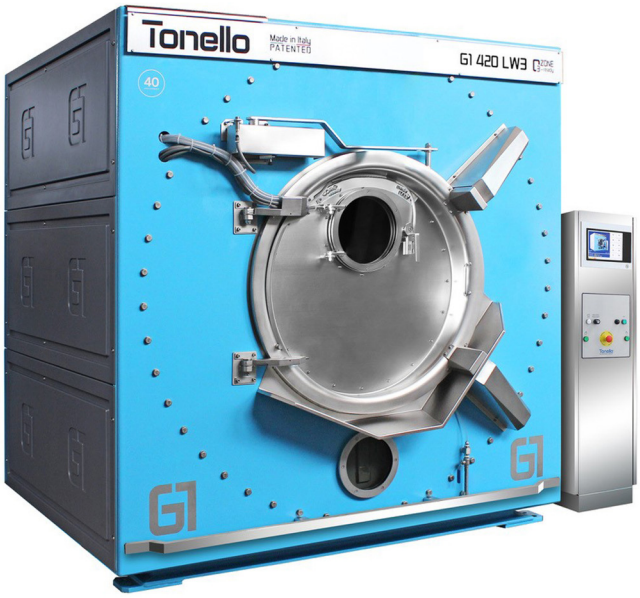
"In fact, depending on the type of machine, this new range achieves energy savings of up to 20% compared to the previous generation (which was already ahead of the market average).

"Water consumption is also reduced to an absolute minimum, with liquor ratios at an all-time low (LR 3:1/2:1). This creates savings of 53 to 96% depending on the process and if other technologies are also installed."

According to the company, the new, more compact machines have been built with materials that reduce losses and consumption as well as increasing the motor's overall efficiency.

It adds, new inverters have also been introduced, allowing for improved motor control which reduces vibration and stress.

She adds: "We also guarantee even better performance, reliability and durability.



Tonello's Evolution 3 machines reduce water and energy consumption

"At such an unpredictable time, where energy and its costs have become a crucial point on which to reason and plan to do business, we believe Evolution 3 can be the key turning point."



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