VOLUME 30
ISSUE ONE 2024

WSA

MANCE & SPORTS MATERIALS



Fillers from the ocean

Brewed protein push

Circular polyester is on the way

Radical vision on custom shoes

THE INTERNATIONAL MAGAZINE FOR PERFORMANCE & SPORTS MATERIALS

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Primaloft's recently launched Ocean Bound thermal insulation, made from Ocean-Cycle certified recycled polyester, has been chosen by Norwegian outdoor brand Helly Hansen.

IMAGE: HELLY HANSEN

Editor
Stephen Tierney

Deputy editor
Clare Grainger

Consultant technical editor
Sophie Bramel

Assistant content developer
Charlotte Robson

Consultant editor
David Buirski

Features writer
Shari Shallard

Publisher
Simon Yarwood

Design
Tim Button

Commercial manager
Rupert Patterson-Ward

Subscriptions manager
John Collins

Administration
Lisa Fabian-Smith

Editorial enquiries
stephen@worldtrades.co.uk

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Sales offices

Head office - World Trades Publishing

The Old Stone House, Teeton,
Northampton NN6 8LH
Tel: +44 151 928 9288
Email: wsa@worldtrades.co.uk

Commercial manager

Rupert Patterson-Ward
Tel: +44 151 319 4972
Mobile: +44 7940 502046
Email: rupert@worldtrades.co.uk

Pakistan sales

Abdul Rab Siddiqi
Email: arsidiqi@yahoo.com

@WTPwsa

linkedin.com/showcase/wtpwsa

World Trades Publishing 2024

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UK Price £90 / ROW £150. Credit cards will be charged in GB Pounds converted at the daily bank rate. Your credit card company may charge you for this service.

Graphic origination by WTP
Printed by Bishops Printers, Walton Road, Portsmouth, Hampshire PO6 1TR

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WSA (ISSN 1356-644X) is published four times a year by World Trades Publishing, The Old Stone House, Teeton, Northampton NN6 8LH, UK.

Global news

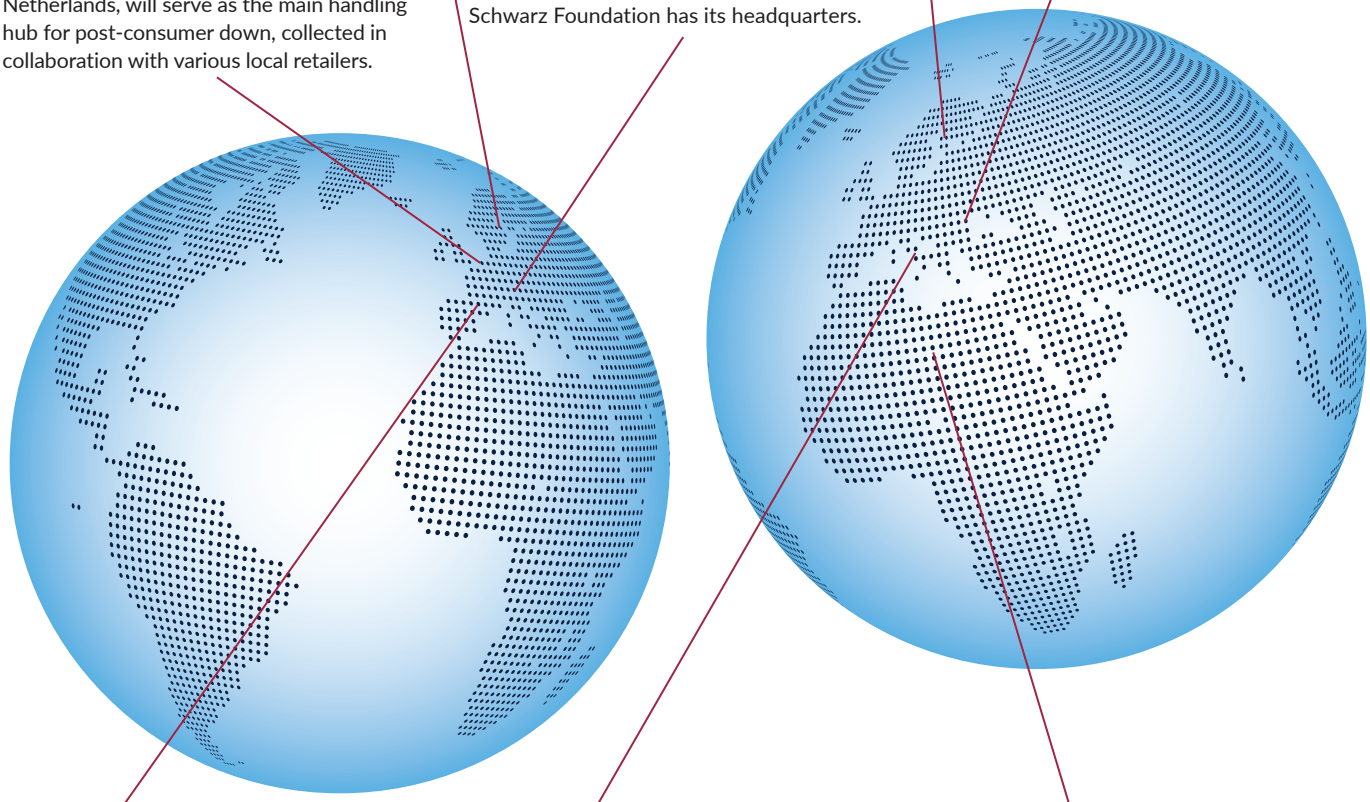
Sweden Private equity firm LionRock Capital has acquired Swedish outdoor brand Haglöfs. The brand has been a wholly owned subsidiary of Japanese sports group ASICS since 2010. LionRock completed the deal on December 18 and said it viewed Haglöfs as a good fit with its existing portfolio and with its strategy of acquiring "well understood heritage brands with best-in-class products". The group has a minority stake in football club Inter Milan and a majority stake in footwear group Clarks.

Finland Amer Sports, the parent group of Arc'Teryx, Salomon, Wilson, Peak Performance and Atomic, has filed documents to prepare for an initial public offering (IPO) of its shares. It has not made public the number of shares it intends to make available or the price it will ask for them. Chinese group Anta Sports became the controlling shareholder of Helsinki-based Amer Sports in 2019.

Netherlands Outdoor brand Rab has extended the roll-out of its end-of-life down recycling initiative across Europe. The scheme, which started with a single down bin at its head office in the UK two years ago, is facilitated by Rab's partnership with Italy-based down processor Minardi Piume. Rab's European service centre in Leusden, the Netherlands, will serve as the main handling hub for post-consumer down, collected in collaboration with various local retailers.

Switzerland Zurich's ETH science and technology university has announced a major new investment from the Dieter Schwarz Foundation, which it has said will allow it to create around 20 new professorships over the next 30 years. Dieter Schwarz is a German billionaire and former chief executive of supermarket group Lidl. The new professorships will be in Zurich, as well as in Heilbronn in Germany, where the Dieter Schwarz Foundation has its headquarters.

Romania Outdoor brand Canada Goose has bought Romanian knitwear producer Paola Confectii, building on its network of seven manufacturing facilities across Canada. It is the company's first European facility, and supports its plan of expanding existing categories and increasing year-round relevance. Knitwear is one of the leading segments of its apparel category, which exceeded $70 million in annual sales in fiscal 2023.



Andorra Fashion brand Oysho, part of the Inditex group, has entered into a new agreement that it says will enhance its position as a supplier of ski apparel. It has set up a partnership with Andorra-based ski resorts group Grandvalira. Oysho said it wanted to strengthen its position in sports in general, to "reaffirm its dedication to innovation and quality, and showcase its technical expertise".

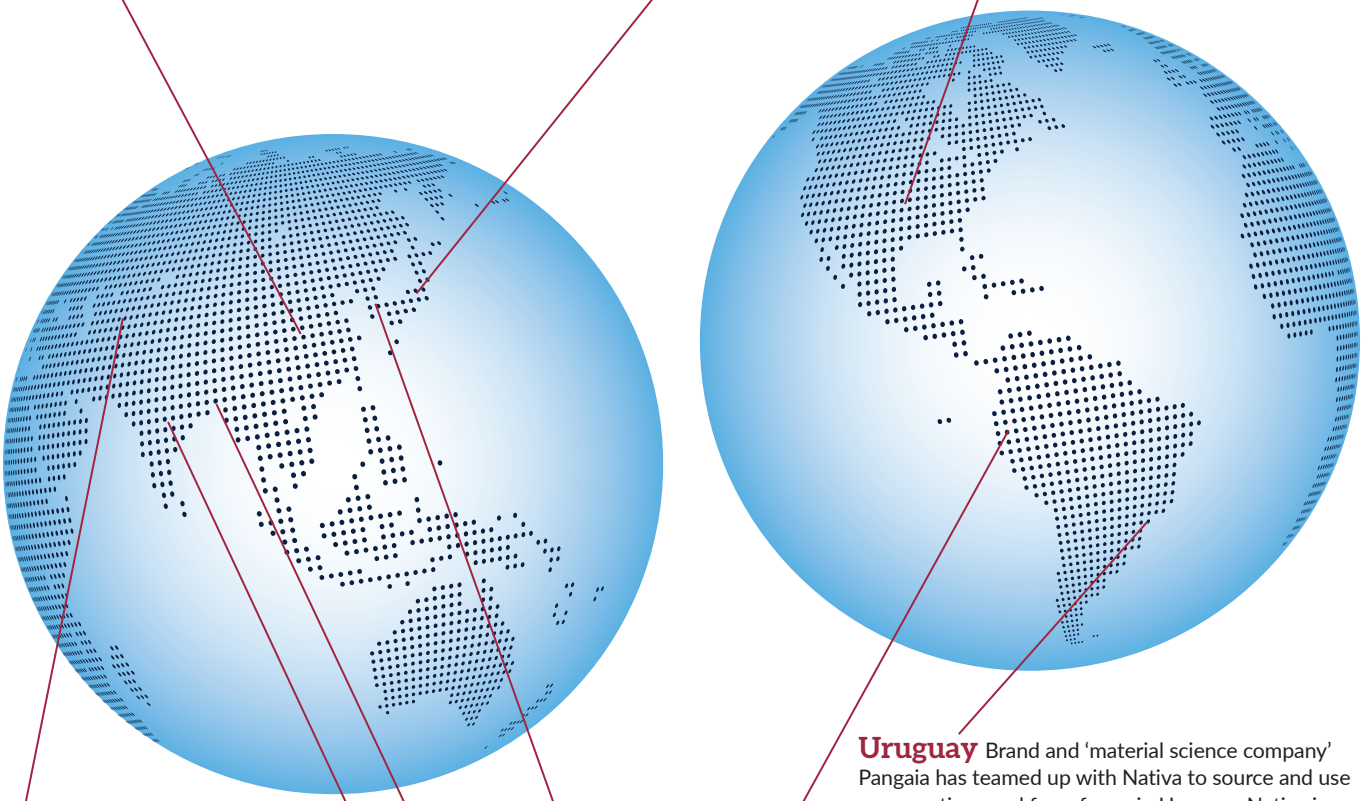
Italy Italian textile group Aquafil has launched a standardised measurement system for microplastics, in collaboration with research institute STIIMA-CNR and Italian standards body UNI. The groups worked together for five years to establish a methodology to measure the microplastic footprint of a process or product and to develop solutions for its reduction. Aquafil claims ISO 4484-2:2023 is the first official standardised global method for the qualitative and quantitative determination of microplastics.

Chad Key stakeholders from Chad's cotton industry gathered recently in the capital, N'Djamena, to discuss the potential for the launch of a new Better Cotton Programme. The meeting was organised by Cotontchad, the country's aggregator and exporter of cotton, sustainability initiative Better Cotton and investment platform IDH and included national ministries, cotton farmer representatives, private sector actors and civil society organisations. Cotontchad supports around 200,000 smallholder farmers across the country.

China Footwear group Wolverine Worldwide has announced the sale of ownership of the business in China of two of its brands, Saucony and Merrell. The buyer is China-based sports footwear brand Xtep. It first formed a joint venture with Xtep in 2019 to launch the Merrell and Saucony brands in China. Now, Xtep has bought Wolverine's share of that Chinese joint-venture business. It will pay Wolverine around $60 million for its share.

Japan Fibres group Toray has announced a recycling breakthrough for its carbon fibre products. It said it had successfully used a pyrolysis recycling process to take material derived from the production process of Boeing 787 components to use as recycled carbon fibre in other products. Initially, it has worked with consumer electronics company Lenovo to put the recycled carbon fibre in laptop computers. Toray's carbon fibre products are also used in sports equipment manufacture.

US The US Bureau of Economic Analysis (BEA) has published data showing the impact of outdoor recreation on the US economy. The sector accounted for $1.1 trillion in gross economic output in 2022 and supported five million jobs. Outdoor Industry Association president Kent Ebersole said outdoor recreation had 168.1 million participants from increasingly diverse backgrounds.



Uruguay Brand and 'material science company' Pangaia has teamed up with Nativa to source and use regenerative wool from farms in Uruguay. Nativa is a network of farms, mills and industry partners that supplies certified wool. Pangaia's wool will come from Cerro Bombero, a family-owned farm located 130 km from the city of Paysandú.

Uzbekistan Rieter, a specialist supplier of systems for manufacturing yarn from staple fibres, has opened a repair services station in Uzbekistan. It said the new facility, located in the capital, Tashkent, would provide spinning mills in Uzbekistan with a faster repair turnaround and minimum production downtime when technical faults develop. Its capabilities will cover mechanical and electronic repairs for all types of Rieter machines, including spinning and winding.

Peru Outdoor brand Paka has unveiled an alpaca fibre-based fleece called Pakacloud, which it claims can outperform standard synthetic fleece in warmth-to-weight ratio. The alpaca wool features hollow medullated air pockets, which reduce heat transfer and create an insulating buffer. Founded in 2017, Paka started with the vision of bringing the alpaca fibre to the outdoor industry, supporting an industry in Peru, where 90% of its products are made

South Korea Several members of South Korea's National Assembly joined the country's Sustainable Fashion Initiative in Seoul in December to discuss policy formation as its textile and fashion industries move to pursue a more sustainable future. The group explored routes to mapping a suitable environmental, social and governance (ESG) ecosystem in the context of the country's bid to achieve carbon neutrality by 2050.

India Fibre manufacturer Birla Cellulose is celebrating its number-one ranking in Canopy's Hot Button Report for 2023. Birla Cellulose is the pulp and fibre business of the India-based Aditya Birla Group. Each year, environmental group Canopy publishes its ranking of fibre producers in its Hot Button report. It ranks viscose suppliers by their willingness to welcome third-party audits, contribute to conservation projects, invest in new products and adopt good sourcing policies.

Bangladesh Bangladesh Apparel Exchange and sustainability hub Fashion for Good recently hosted a two-day visit for manufacturers to learn about chemical recycling technologies for textiles. 'Chemical Recycling Technologies: Manufacturing Markets Gateway', which was also hosted in partnership with Circ and Infinited Fiber Company, focused on integrating the technologies into the local manufacturing landscape, securing feedstock partnerships and developing a value chain for recycled clothing.

People

Leader joins Lycra


CREDIT: THE LYCRA COMPANY

Fibre manufacturer The Lycra Company has announced **Gary Smith** as its new chief executive.

He took up the role at the end of November, when acting chief executive, **Dean Williams**, returned to his role as chief finance officer; he will help his successor with the transition.

Gary Smith became chief executive of performance fabrics manufacturer Polartec in 2012, following spells at Timberland and McKinsey & Company. He remained in this role until 2019, stepping down when Polartec was acquired by Milliken. Since then, he has led a business turnaround at Hatteras Yachts.

He has described The Lycra Company as an "incredible organisation, with world-class brands, a pre-eminent market position and a history of innovation".

Circularity call

The president of Taiwan-based yarn, fabric and garment producer Kingwhale, **James Huang**, travelled to Dubai for the 2023 United Nations Climate Change Conference (COP28), which officially ended on December 12.

At the event he took part in a series called COP28 Leadership Interviews, organised by news organisation Reuters. He said he believed a system called Revio was a good example of increased attention that the performance textiles sector is paying to the circular economy now.

Kingwhale has described Revio as "revived polyester". It derives from textile waste and can bring about what the company has called a new business model for keeping products in use for longer.

"Our investment in Revio involves taking post-consumer and post-industrial waste, putting it through a chemical process and turning it into new material," Mr Huang said at COP28. "This resolves several issues."

He said Revio will reduce the use of the petrochemicals that go into virgin fibres and, thereby, reduce the textile industry's impact on the environment. It will also mean less textile material being incinerated or going to landfill. "We are looking at a closed-loop circular system," he said. "That's what we are trying to create."

Forward-looking

Vienna-based knowledge exchange and business media and event company Wemorrow has selected HeiQ chief executive and co-founder, **Carlo Centonze** to be part of a programme it calls Forward20.

This programme recognises innovators for their contributions to what Wemorrow calls "the sustainable transformation of the economy". It has four focus areas: food, energy, buildings and textiles.

Forward20 is not a ranking or a certification, the Austrian company states, but instead comprises "a handpicked selection of people who are working to make the economy better".

It invited Carlo Centonze to be part of the group in recognition of HeiQ's work to develop Aeoniq, the new cellulose filament yarn made from sustainable raw materials that it launched in 2021.

Other well known industry figures that form part of Forward20 include the chief executives of Sympatex and Kelheim Fibres, **Dr Rüdiger Fox** and **Craig Barker**, respectively.

Success rewarded

Sports group ASICS has added Brazilian tennis player **Beatriz Haddad Maia** to its roster of sponsored athletes. This follows Ms Maia's most successful year ever in 2023; she finished the year ranked number 11 in the world. She will begin wearing ASICS tennis apparel and footwear immediately.

Policy moves

The American Apparel and Footwear Association (AAFA) has appointed **Gary Jamgotchian** as sustainability policy coordinator. It has also hired **Audrey Clark** as trade policy coordinator and **Brielle Papalia** as content manager for events and programming. AAFA counts more than 1,000 brands, retailers and manufacturers as members. These include adidas, Allbirds, Berghaus, Brooks Running, Canada Goose, Ecco and Fabletics.

Product development

US brand Vasque Footwear is expanding its product department with the hire of **Austyn Dunham** as product developer. She will be responsible for managing the construction as well as collaborating with the suppliers. She joins **Jes Sandrin** and **Scott Kendall** on the team. "In the past three years our product team has changed dramatically," said **Amy Peck**, director of Vasque Product Creation.

Material interest

Fashion designer **Christopher Raeburn** has confirmed that he is taking up the post of global creative director of Napapijri. Napapijri has been part of VF Corporations since 2004 but has its roots in using materials such as waxed cotton canvas fabrics in jackets, sleeping bags and backpacks. Christopher Raeburn's previously worked with brands including Eastpak and The North Face.

Tuomas takes the helm

New chief executive **Tuomas Oijala** took the helm at Finnish fibre developer Spinnova in December, following his appointment in August. Mr Oijala replaces **Kim Poulsen**, who announced his departure last April. Chief financial officer **Ben Selby** was responsible for steering the biomaterials company during the interim.

Chief executive of SAC to step down

Campaign group the Sustainable Apparel Coalition (SAC) has announced that its chief executive, **Amina Razvi,** left the role at the end of 2023. It said the decision was a mutual one between Ms Razvi and the board of directors.

She joined the organisation eight years ago and worked in various senior roles before taking over as chief executive in 2019. Since then, membership of the SAC has doubled and now numbers more than 300 organisations.

At the time of the announcement, she said she was eager to continue working "on the issues I'm deeply passionate about". She added that she was looking forward to a new role that would allow her to drive meaningful change, and positively impact people and the planet".

New era for Equip

Equip Outdoor Technologies is to appoint a new chief executive. The parent group of outdoor brands Lowe Alpine and Rab has grown its turnover to £120 million in its most recent financial year and has a new five-year strategic plan in place to increase growth further, but owner, **Matt Gowar,** has said he will step down from the day-to-day leadership of the business.

Mr Gowar began the business 30 years ago, importing gloves into the UK. Equip acquired Rab 20 years ago and added Lowe Alpine to its range of brands 12 years ago.

"Knowing that the business is in such a strong position, I look forward to finding someone who can step into the CEO role to bring new experience and leadership to our existing board and lead Equip to achieve the next five-year strategic plan," Mr Gowar said. "This will allow me to concentrate on the areas of the business in which I have the most expertise and also free up my time to do the things I have missed out on whilst building the business: time with my family and my personal interests."

Supply chain leadership role

Footwear group Wolverine Worldwide has appointed **Bishu Jayaram** as its chief supply chain officer. This is a newly created role at the Michigan-based group. In this position, Mr Jayaram will have responsibility for global sourcing, distribution, logistics, and integrated planning. Wolverine said he would play "a critical role in driving its ongoing transformation into a consumer-obsessed growth company".

Mr Jayaram has more than 20 years' experience in supply chain and sourcing roles and has served as Wolverine's senior vice-president of global sourcing for the past two years.

Before joining Wolverine, he spent six years with VF Corporation in a variety of supply chain capacities, including leading Asia sourcing for all footwear, equipment, and packs. He also led global material supply for all apparel, footwear, and equipment.

Current president of Wolverine's global sourcing group, **Jim Zwiers**, will leave the group in the early part of this year.

Puff appeal

Biodegradable materials, recyclable garments and "design at the intersection of performance and sustainability" are all areas of focus that will help the textile and apparel industry become more circular.

This was the main message from the sales manager in Asia for materials developer 3M, **Totti Liang**, at this year's ISPO Academy Masterclass, which took place in Munich at the end of November.

"Landfills throughout the world are full of old clothes," Mr Liang said during a workshop he hosted at the event. "If there's one lesson I want young product designers to walk away with, it's that circularity can help save our planet for future generations to enjoy."

For the Masterclass, 3M provided samples of its Flowable Featherless Insulation material for design students to use in prototype garments. The material has at least 80% recycled content, and 3M presents it as a lightweight, high-loft, synthetic insulation for use in puffy garments.

Puma return

Sports group Puma has appointed **Ryokusai Inoue** as its new general manager for Japan with immediate effect. Ryokusai Inoue joined Puma Japan in 2015 as director of retail. The company has said the work he carried out in this role "laid the groundwork for solid growth" in the Japanese market. He left in 2022 to become country manager for Japan for Tesla but has decided to return. He will replace **Kohei Hagio**. Chief executive, **Arne Freundt**, said he was glad of Mr Inoue's return.

Growth driver

Freudenberg Performance Materials has a new chief executive. **Dr Andreas Raps** took up the role on January 1, replacing **Dr Frank Heislitz**. Since 2016, Dr Raps has been chief executive of Eagle Burgmann, a specialist developer of industrial sealing solutions that Freudenberg set up as a joint-venture company with Japanese group EKK. He said he would seek to drive growth in his new role by focusing on customers, digitalisation and sustainability.

Operational role

US materials developer PrimaLoft has named former Saucony president **Anne Cavassa** to the same role in "a strategic move" designed to reinforce growth, innovation and sustainability. Chief executive **Mike Joyce** will continue to oversee PrimaLoft's long-term strategic direction, while Ms Cavassa will assume day-to-day operational responsibilities.

Open access

Outdoor Foundation, the philanthropic arm of the US Outdoor Industry Association, has named **Lesford Duncan** as executive director. He brings over a decade of experience in public management in government and nonprofits. Through community grants and research, the foundation works to address equity barriers and help make the outdoors accessible for all.

Golf gear move

Current Olympic golf champion **Xander Schauffele** has signed a multi-year contract with Japanese sportswear brand Descente. The Olympic gold-winner will wear apparel from Descente in training and competitions. He will also work with the group to develop golf products and "strengthen its golf category line-up", particularly in Japan, South Korea and China. Descente said the agreement would "ensure the further evolution of the brand".

Industry & Innovation

Down development


CREDIT: WOLFSKIN

Outdoor brand Jack Wolfskin is to use quick-drying ExpeDry insulation material from Allied Feather + Down in its autumn-winter 2024 apparel collection.

Allied's creative director, Matthew Betcher, said there were shortcomings with the hydrophobic chemistry in use in much of the down material in outdoor jackets at the moment. He said these products work well when the material comes into direct contact with water droplets, but is much less effective when the down in jackets comes into contact with humidity and water vapour. "In real-world situations, traditional hydrophobic chemistry is far less efficient," he said.

He explained that ExpeDRY, created in partnership with Fuze Technologies, with gold particles permanently bonded to down plumes, keeps vapour from condensing, allowing it to evaporate more easily.

Structural developments

Shoe components developer Stanbee has followed up on the earlier launch of Nitro Force with heel counters and toe boxes branded Nitro Flex, Nitro Vulc and Nitro Sport.

Chief executive, Michael Berkson, highlighted each new product's key differentiator. Stanbee Nitro Flex heel counters offer "unparalleled flexibility", he said, while Nitro Vulc delivers "exceptional fit and comfort in vulcanised footwear". Nitro Sport rounds out the line-up with "high-performance toe boxes that are lighter, softer and more resilient", alongside increased recycled content.

"All of our Nitro products are injected with a foaming system that displaces raw virgin materials, thereby reducing weight and improving performance," Mr Berkson continued. "It is our mission to produce the lightest, thinnest, strongest, most resilient structural footwear materials in the industry."

From carbon to glass

Sports brand adidas has updated its latest Adizero with a double layer of Lightstrike Pro foam and reimagined Energyrods 2.0 to provide cushioned propulsion. The Adizero Takumi Sen 10 is built specifically for 5-10k distances and benefits from a series of technological updates from its predecessor.

The rods in the midsole are made from partly recycled glass fibre. Previous versions of the Takumi Sen offered a combination of a carbon plate in the heel and separated carbon-infused rods in the forefoot, mirroring the shape of the metatarsal bones in the feet.

Glass fibre is more flexible than carbon, crucial for navigating tight corners of 5-10k road races and enduring the high impact experienced from running fast on hard ground, said adidas.

Fabric choices

Outdoor brand Houdini Sportswear has said the new Flow Shell jacket and pants that it had on show for the first time at ISPO in November represented "a sneak peek" of a new impact assessment that the company is preparing to publish this January.

Water repellency launch

Pulcra Chemicals has joined forces with its subsidiary, Devan Chemicals, to introduce Devan Repel, a new brand in the water repellency market.

The first product, Devan Repel One, is a durable water repellent for polyester and blends and is free from perfluorinated compounds (PFCs) and isocyanates. Performance, particularly on durability, can be boosted to meet different requirements with the new Devan Extender Gen3.

Wood-based

A project to make a fleece jacket from wood-based polyester is complete and the partners behind the initiative, UPM Biochemicals and Vaude, unveiled the finished garment at ISPO Munich in late November

The companies have said they wanted to work together on this project to show that "thinking beyond recycling" and a shift towards renewable materials in textiles are already possible.

Resin used to make polyester for the jacket contains 30% monoethylene glycol, which is traditionally sourced from crude oil. In the process UPM and Vaude have used, this ingredient was entirely replaced by a bio-monoethylene glycol (BioMEG), UPM's BioPura.

Safe thread

Manufacturer of thread and structural components for apparel and footwear Coats Group has received Cradle to Cradle Certified Material Health certification for its sewing thread. Certification validates the chemicals and materials used in the products as being safe for human health and for the environment. Chief executive of Coats' apparel division, Adrian Elliott, said: "We are committed to a sustainable future with products that are safe chemically and environmentally."

Foam feast

Sports group Puma introduced a new version of its Velocity Nitro shoe at the start of the year. This, the third release of Velocity, incorporates an extra two millimetres of the company's proprietary foam material, Nitro. It describes Nitro as a nitrogen-infused foam technology that provides cushioning, comfort, versatility and "explosive energy".

Houdini began publishing formal reports on its environmental impact in 2015. It bases its reports on the Planetary Boundaries Framework, a system developed by Swedish scientists for assessing the impact of human activity on the planet.

Chief executive, Eva Karlsson, said: "We are using world-leading science to evaluate all aspects of the impact our business has on our planet's ecosystems. It is a very tangible way for us to improve and to show our love and respect for nature." Part of its response is a programme for snowsports that it calls Ride Clean. For this, Houdini has developed a complete layering system, from base to shell and insulation garments, that it says are made with circular fabrics, completely free from PFAS or other toxic chemicals.

Among the materials it is using for these garments is Polartec Power Shield, a three-layer shell fabric now made with Biolon. Polartec describes Biolon as a renewable, non-GMO plant-based nylon, with a 50% lower carbon footprint than virgin nylon 6,6 and a reduced reliance on fossil resources.

"For a long time, many thought that more sustainable options meant a loss in performance, but Polartec has proved that this is not the case," said the fabric developer's business manager, Ramesh Kesh.

Drive-distance dust-up

Golf governing bodies The Royal and Ancient Golf Club of St Andrews (R&A) and the United States Golf Association (USGA) have announced an update to the testing conditions for golf balls. It will take effect from January 2028.

They have said that their aim is to "reduce the impact increased hitting distances have on golf's long-term sustainability".

Chief executive of the R&A, Martin Slumbers, said the change was one of the keys for "achieving a sustainable future for golf, protecting the integrity of the game and meeting our environmental responsibilities".

Ball manufacturers who want their products to win approval for use from the governing bodies will have to make changes to make sure they continue to comply.

Pre-stretched merino

Australian merino wool promotions body The Woolmark Company has worked with long-term partner Shandong Nanshan Textitle Apparel Company to develop new yarns for sports apparel.

They have developed fibre-stretching technology that pre-stretches merino wool fibres before spinning. This has allowed them to develop yarns that are particularly suitable for weaving wind- and water-resistant fabrics without any chemical treatments.

The resulting fabrics, in various weights and blends, can be applied to soft-touch windbreakers, pants, shirts and footwear, The Woolmark Company said. It has added these new yarns to a range called Optim, which it developed with Nanshan.

Best of both

Teijin Frontier has developed a high-performance fabric for sportswear that it says combines the texture and functionality of polyester and nylon. Microft MX is made from highly-deformed cross-section multifilament yarn, which is a uniform mixture of single filaments of polyester and nylon, using a unique spinning technology.

The raw yarn has a gently V-shaped highly-deformed cross-section, which provides bulkiness and a spun-like soft texture. Uniformly mixing polyester and nylon on the surface and in the structure of the woven fabric produces a combination of desirable features from both materials, such as the abrasion resistance and colour development capabilities of nylon, and the water absorption, quick-drying properties and shape stability of polyester, it added.

Teijin Frontier will begin promoting Microft MX fabric for the 2025 spring and summer outdoor clothing and sportswear collections. Applications will then be expanded to include functional clothing of innerwear and fashion clothing, with the aim of selling 500,000 metres per year by 2026.

Light touch

Ski brand La Sportiva has selected impact-absorbing materials from the UK's D3O to create skis that are 20% lighter without compromising on strength. It has released four new ski models along with two new lightweight alpine touring boots. The addition of D3O, a material used in crash protection pieces, helped improve overall performance. It is also offering two new lightweight boots, the Kilo and the Stratos Hybrid.

Pay-to-grow

US-based Panda Biotech is nearing completion of its hemp processing centre in Texas, which will process 10 tonnes of industrial hemp per hour. The company says it will be the largest hemp decortication centre in the western hemisphere and among the largest in the world. Panda Biotech is now asking farmers to grow hemp feedstock for the 2024 growing season. It has created a pay-to-grow programme which includes up-front money and agronomy support.

Single synthetic

Decathlon-owned outdoor brand Quechua has unveiled a mono-material hiking shoe, made using only a single synthetic material as opposed to the six typically required by its NH100. The new model, named the NH One, is the latest iteration of the brand's NH100 style. Quechua sold three million pairs of the NH100 last year.

Microfibre test quest

Sports group Under Armour is to make its new test method for controlling the shedding of microfibres available for the wider market to use. It announced a breakthrough in testing for microfibre shedding earlier in 2023, saying the test method it had developed was the result of years of research. It has now teamed up with testing solutions supplier James Heal to make kits for the test available for purchase.

Clarification

We made reference on page 23 of the last issue of *WSA* to investment that textile innovator HeiQ has made in its AeoniQ fibre. The company has asked us to clarify that it is investing $100 million in stage one of the scale-up of production of AeoniQ and that, to finance this project, it will avail itself of equity funding, grants and loans.

Backtrack

Limitations on space make it impossible for us to run more than a carefully selected sample of industry news in *WSA*. However, we publish hundreds more stories on www.sportstextiles.com, one of the most comprehensive archives of news anywhere on the web for textiles, apparel, footwear and equipment for sports and outdoor. Below are just some of the headlines that have appeared on the site in recent weeks.

08.01.2024
Record sales for Vivobarefoot as it focuses on 3D print strategy

Inov8 predicts 'biggest year since launch'

05.01.2024
Marathon record shoe sells out in two minutes

Padel apparel brand secures UK deal

04.01.2024
Cautious consumers hurt growth for JD Sports

03.01.2024
Simplify EU sustainable textiles rules, says Euratex

Polygiene sees 2024 as turning point

EOG makes Race To Zero mandatory

02.01.2024
Dates confirmed for ITMA Asia

Job losses on the cards as Nike focuses on profits

20.12.2023
CmiA developer introduces Regenerative Cotton Standard

Love for nature drives Houdini fabric choice

Woolmark highlights lasting appeal of merino garments

Textiles division sales prop up Archroma Pakistan

19.12.2023
OMA aims to boost outdoor footwear sales

18.12.2023
Reebok ventures further into metaverse

15.12.2023
Rab's newest gloves use Gore's ePE exclusively

Naia Renew achieves GRS certification

January seminar on Oeko-Tex changes

13.12.2023
Around 18% of sports equipment still falling foul of EU laws

12.12.2023
Fifth consecutive Dow Jones Sustainability success for Moncler

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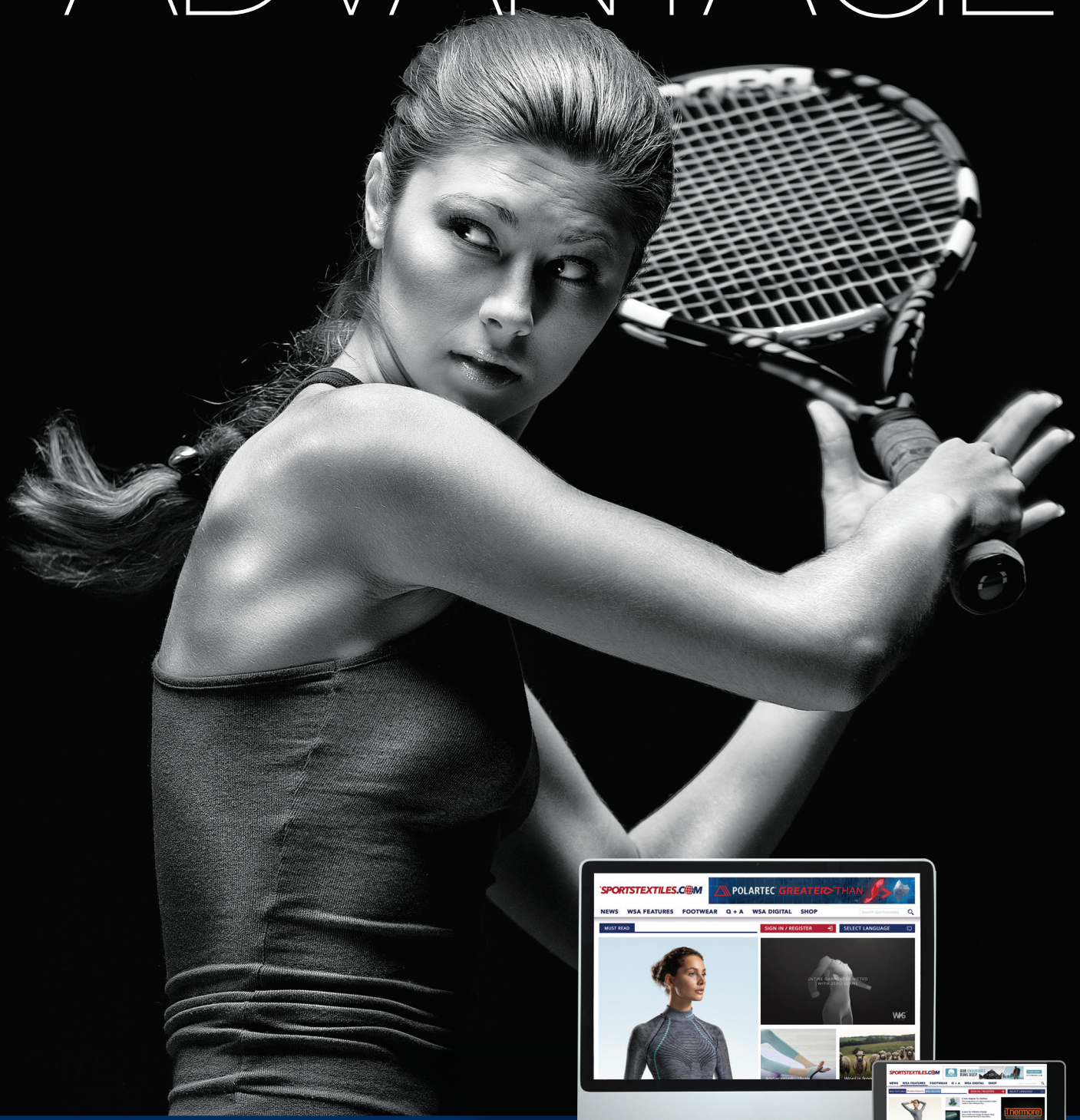
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A new category of recycled synthetics uses material at risk of ending up in the open sea or recycled from debris fished out of the ocean. These two sources constitute, regrettably, a near unlimited supply.

Ocean-bound versus Ocean-found

Tired of recycled polyester made from beverage bottles? Ocean-bound plastics are coming on board offering a new, and possibly more compelling, option. Unifi and Primaloft introduced this new family of recycled polyester fibres a few years ago, Thermore launched a range last summer and Advansa is making its comeback into apparel applications riding on the same wave. Its polyester yarns are not only made from abandoned plastics but are also enhanced with an additive that accelerates biodegradation, potentially lessening their ability to pollute waterways. The noble cause of reducing plastic pollution, particularly this highly visible form that taints tropical beaches, is being seized upon to drive a new slate of sustainable strategies and marketing messages.

The concept is, at first blush, commendable. But what exactly is ocean-bound plastic? The vagueness of the term raises several flags. At what point is a piece of plastic deemed at risk of ending up in the high seas? What about the plastics that are not ocean-bound, but ocean-found? These are legitimate questions as awareness grows of the pervasiveness of plastics in the environment, including of course the massive gyres, some say continents, of debris in the oceans.

As can be expected, it is difficult to quantify the amount of plastic in the world's oceans. A report on marine litter and plastic pollution published by the UN Environment Programme in 2021 gives a wide ballpark to work with. The volume of plastics that are in the oceans could be anywhere between 75 million and 199 million tonnes, it says. Depending on what approaches are used, it has been estimated that plastic waste entering aquatic ecosystems yearly, based on 2016 data, could be 9 million to 14 million tonnes, or 19 million to 23 million tonnes. The report's projections vary accordingly, with one view assuming that as much as 53 million tonnes will reach oceans every year by 2030.

Whatever the reality of plastic pollution in marine ecosystems, research confirms that there is an ample source of waste that should find better uses. It not only pollutes coastal ecosystems that affect marine life but all living beings, including humans. Preventing these abandoned plastics, possibly a better term for this form of waste, from entering the oceans is obviously a good idea. They will be more at risk of doing so in regions where sanitation services are lacking or overwhelmed. These are places where the task of cleaning up beaches and coastal regions is for the most part left to local, informal networks.



Norwegian outdoor brand Helly Hansen is one of the first to adopt Primaloft's Ocean Bound fillers certified by Ocean Cycle.
CREDIT: HELLY HANSEN

A number of social and environmental organisations have sprung up to address the issue by putting together and certifying full recycling supply chains, from collection to production, backed by traceability, often GPS-tagged. Their mission extends to supporting the local communities that do the picking.

The definition of ocean-bound plastics, as set by these organisations, has reached a form of loose consensus. Zero Plastic Oceans, an organisation based in France, manages the Ocean Bound Plastic (OPB) label. It covers all types of abandoned plastics that municipal or private sanitation services do not collect. These can be found in the ocean, in an area located within 200 metres of river mouths and shores, or up to 50km away from the coastline.

sandOcean, a brand founded by Canary Islands-based Ana Santonja, has chosen a fabric made from Seaqual yarns for its launch range that features prints inspired by Fuerteventura. The second collection will focus on Lanzarote. It plans to propose a range for each of the islands.
CREDIT: CHRISTINA CUNNINGHAM


SURFBOARDS



Patagonia has introduced two Gore-Tex jackets using the new ePE-based membrane laminated to a fabric made from 50% ocean-bound plastics and 50% post-consumer PET, all from Costa Rica, through a partnership with Bionic.

CREDIT: PATAGONIA

Mismanaged waste, another term used to describe ocean-bound plastics, has the advantage of drawing attention to the fact that waste collection can be deficient or lacking. Nextwave, a framework for socially responsible ocean-bound plastic supply chains, has also set its perimeter at 50 kilometres from a waterway or coast.

And this is how the notion of a 50km radius from a coast has come to be a standard for what is now commonly called ocean-bound plastics.

A growing offering

Unifi, a US-based producer of polyester, introduced its first Repreve-branded recycled yarns made from ocean-bound plastics in 2019. They are certified by Ocean Cycle, which "supports coastal recycling programmes for at-risk areas," says Diederik Janssen, brand and sales manager for Europe. He notes that this social enterprise seeks not only to prevent ocean plastic pollution but also to improve livelihoods in coastal communities through certification and direct social interventions. Brands that have integrated the Repreve Our Ocean yarns include H&M, Primark, Quiksilver, and even Tiffany in its Smile Bracelet (sold for €1,100).

US-based insulation specialist Primaloft launched a range of fillers made from ocean-bound plastics that same year with Parley for the Oceans. It has since introduced a new range certified by Ocean Cycle. Nordic sportswear brands Helly Hansen and Isbjörn are early adopters and featured the filler in this winter's ranges. "OceanCycle's values, focused on collaboration and transparency, align with our Relentlessly Responsible mission to reduce impact. They are a renowned and respected source of coastal plastics," says Tara Maurer-Mackay, Primaloft's head of product strategy.

Another insulation maker, Thermore, introduced recycled polyester made from ocean-bound plastics in its range of free fibre fillers, Ecodown Fibers Ocean, in 2023. These are also certified by Ocean Cycle. "This new reference has the same properties as our other ranges, it is very soft and packable, and has an even more down-like hand feel. Demand is high for this product," Thermore sales manager Oliver Brandes tells *WSA*.

Polyester producer Advansa, under new ownership since 2020 when investment holding company Sverige Netherlands acquired the former DuPont company, is now part of group that also owns Asia Pacific Fibers (APF), an Indonesian producer of polyester. The launch of Remotion yarns made from ocean-bound plastics is the first tangible fruit of this collaboration, says David Bayliss, Advansa's managing director. "Turning PET bottles into rPET was formerly one of our main businesses. We were processing up to 2 million bottles per day." During what he calls the "bottle wars", the price for post-consumer bottles increased threefold. It hit Advansa's business hard, leading to the buyout and transfer of fibre production from Germany to APF in Indonesia. The archipelago of 17,000 islands has varying levels of effective sanitation services, inspiring the two partners to make the new yarn from

Insulation specialist Thermore is seeing high demand for its newest free fibre filler made from ocean-bound plastics, Ecodown Fibers Ocean, also certified by Ocean Cycle.

CREDIT: THERMORE



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abandoned plastics, certified by Prevented Ocean Plastic. This organisation, he says, has invested heavily in supporting the informal collection of plastic debris in the islands lacking operational garbage collection.

"Plastics that are in the ocean, as opposed to being on land, are prohibitively expensive to collect and cannot be mechanically recycled," Mr Bayliss goes on to explain. "This is why it makes sense to collect them on land, before they enter the ocean." He adds that APF has set up a production line specifically for recycled PET that can even spin microfibres. Remotion yarns, he says, are 100% recycled and deliver the same performance as a conventional fossil-fuel based polyester.

Rescuing ocean debris

Seaqual is one of the few organisations to offer polyester yarns recycled from plastics fished out of the sea. The company based near Girona, Spain, has set up collection networks with fishing operations in Mexico, Tunisia, Egypt, Vietnam and the Philippines. They recovered 1,000 tonnes of marine litter in 2023. These ocean-found plastics are, however, "heavily degraded by exposure to UV and salt water, as opposed to ocean-bound plastics that are 'fresh'," says François Devy, director of operations for the Seaqual Initiative. Like ocean-bound plastics, they are mechanically recycled into yarn by a production partner, Spanish producer Antex. But only 10% can be integrated into a polyester yarn, blended with post-consumer PET from land sources. "In addition to its factory in Spain, Antex has facilities in the US and Brazil, which makes it possible to produce the recycled polyester yarns locally," he adds.

Seaqual's mission, he says, encompasses supporting local communities by paying a premium to those that suffer most from marine pollution. The entire system is also transparent, backed by a chain of custody, from the location where the debris was collected to the Antex factory and ultimately to the brand. "We will soon have a fully traceable and transparent system up and running to enable brands to use that information in their marketing," he tells *WSA*. This digital passport in development will indicate where the plastics were collected along with their environmental and social impacts. It should, he says, "help increase the price that a family based in Egypt gets paid to reduce marine pollution."

Brands sourcing Seaqual-branded polyester yarns numbered 2,200 in 2023, up from 71 in 2018. The company is now working on the launch, this year, of its first range of polyamide 6 or 66 yarns made from chemically recycled fishing nets. "Nets have been collected from the start, but they were not certified or recycled into textile yarns," he says.

Italian polyamide producer Aquafil has been recycling fishing nets, and carpets, to make its chemically recycled Econyl-branded 'regenerated' nylon 6 since 2011. It is a co-founder of Healthy Seas, an organisation that reclaims discarded fishing nets and celebrated its tenth anniversary last year. In its 2022 sustainability report, Aquafil says Healthy Seas recovered 905 tonnes of abandoned fishing nets and other marine litter.

South Korean conglomerate Hyosung has been offering a polyamide 6 yarn made from recycled fishing nets since 2007, making it a pioneer in this space. The company has recently increased capacity for its recycled nylon, which is made from both pre-consumer and post-consumer waste, Simon Whitmarsh- Knight, Hyosung marketing manager

COLLECTION & CERTIFICATION

When strewn beyond the grasp of sanitation systems, plastics abandoned in nature are left for informal waste pickers to bring them to sorting and processing centres. Various organisations, public and private, for profit or not, have coordinated supply chains to recycle them into fibre, thus creating a source of funding for the debris collected. This helps support the local communities that are directly affected by plastic pollution and have little resources to take care of the problem.

"When brands invest in certified ocean-bound plastic (OBP), they create a source of direct payment to informal collectors," says Vincent Decap, co-founder of Zero Plastic Oceans. In addition to its OBP certification programme, it is launching a new platform, Social+ OBP, with a stronger focus on enhancing the livelihoods of waste pickers. It draws on existing ethical trading standards, such as the amfori Business Social Compliance Initiative. But these programmes rarely apply to informal activities, Mr Decap tells *WSA*. "We saw the need to develop our own standard and give collectors the direct and indirect benefits of being employed by a company." The programme seeks to ensure the many facets of decent working conditions. "If children are found to be on the field, whether they are working or not, this can be due to various reasons, including a lack of day care services. In this case we will try to find a solution that addresses the issue for the long term," he says. For those that have no official domicile, the organisation can provide a postal address, assist in obtaining ID or social security papers along with providing medical check-ups and training. Importantly, Zero Plastic Oceans also seeks to ensure waste pickers receive a stable revenue and trace of it, which should enable pickers to get a lodging or a bank loan. Finally, the Social+ OBP framework also pays pickers 10% above market price for the plastics (mainly PET and HDPE).

Ocean Cycle, a certification system adopted by many performance materials suppliers and sports brands, was launched in 2018 as a social enterprise and public benefit corporation. Its roots go back to Haiti and the aftermath of the 2010 earthquake, Ryan Schoenike explains. It has a strong social focus to ensure better working conditions for waste pickers. "Conditions on the ground are not always straightforward; we are talking about households trying to make extra money," he says. "But we can set up day-care services, provide shelter or educational and training programmes." Training, he notes, can help improve collection practices, and revenues, as the dirtier the material, the higher the cost to process it.

Ocean Cycle certification covers the entire ecosystem, from collectors to processing facilities, and includes a supply chain for the recycling of PET plastics into textiles. "Our advantage is that there is more supply than demand today," says Mr Schoenike. He also insists on the high quality of the recycled PET, that can be, if requested, food grade. "Our plastics are very clean because they are segregated at the source."

As demand grows, these programmes are also expanding their scope. Ocean Cycle is launching a pilot test for the recycling of films. These multi-layered plastics (MLPs) are difficult to recycle and much lighter than PET or HDPE plastics, and are therefore not worth the time and effort, until a recycling supply chain is created. Zero Plastic Oceans now also certifies plastics that are captured in the sea, to incentivise collection by fishing crews and avoid having this unwanted catch dumped back into the ocean. "Often fishermen have to pay for bringing back their nets and plastics. If we make this collection free, that will motivate them," says Mr Decap.

for textiles, tells *WSA*. Fishing nets, he says, are mostly made from nylon and some 60% can be recycled into new yarns. The company offers two versions of its regen nylon, a yarn made from 100% post-consumer recycled waste and one that is a 50/50 blend of post-consumer recycled and virgin nylon, both fully traceable and GRS-certified.

Patagonia uses both ocean-found and ocean-bound plastics in its ranges. It has developed two mountaineering jackets integrating WL Gore's ePE Gore-Tex membrane laminated to an outer fabric composed of 50% ocean-bound plastics collected in Costa Rica through a partnership between Bionic and Gore, and 50% PET waste collected by official sanitation services in the country. But the US-based outdoor brand has also, since 2014, offered products made from NetPlus nylon, 100% recycled from discarded fishing nets. These are collected from fishing communities in South America through a partnership with Bureo, a company based in California, that Patagonia has invested in. It says that this programme has made it possible to collect and recycle more than 2,000 tonnes of discarded fishing nets over the years.

Demand for ocean-bound plastics is growing, confirms Vincent Decap, co-founder of Zero Ocean Plastics. "In the past six months, we have had numerous textile and apparel manufacturers based in China requesting ocean-bound plastics certification." Marine pollution is a global issue that resonates widely in society, he adds, even though these lost plastics only represent a meagre percentage, in the range of 1% to 3%, of all plastics produced. "Everyone loves the beaches, and consumers feel deeply concerned by the issue. People see it as an immediate and tangible problem, as opposed to the more abstract notion of greenhouse gas emissions," points out David Bayliss at Advansa. François Devy, at Seaqual, is quick to add that there are two distinct issues here: the plastics that are truly ocean-found versus those that are, potentially, ocean-bound.



The Seaqual Foundation has set up four global collection points for plastic debris fished out of the sea. Some 2,200 brands, mills and manufacturers are now a part of its certified network.

CREDIT: SEAQUAL INITIATIVE



> **The further a polymer is broken down, the more energy is needed. Energy is also needed to build a polymer back up.** JOSSE KUNST, CuRe

Chemical recycling scales up



New factories for depolymerising polyester textiles are in the works. Using a variety of 'advanced' or molecular recycling processes, they promise to treat textile waste that cannot be mechanically recycled. In a few years, an industrial infrastructure for circular polyester could be up and running.

Innovation and legislation are driving progress to solve a particularly tricky issue: what to do with the increasing quantities of apparel, new and used, that are discarded every year. The EU is working on directives that will make it more difficult to dispose of textile waste and that may also incentivise the integration of recycled content in new clothes. This context is fuelling funding towards companies whose technologies can recycle blended textiles, carpets, and other complex forms of PET waste. These advanced, molecular or chemical recycling techniques, which broadly mean the same thing, depolymerise, or revert polyester-based textiles back into their original building blocks, are delivering virgin-grade monomers to start a new cycle.

France is particularly active in this field. A wide-reaching reindustrialisation plan, France 2030, has attracted, and supports, ambitious plastics and textiles recycling projects. These include Carbios with Indorama Ventures, Loop Industries with Vinci, and Eastman. Regional authorities often pitch in to these greentech ventures, as seen at French start-up Recyc'Elit. It is rumoured that others, maybe Circ, are also looking to take advantage of this favourable environment and may build their first factories in France.

But France is not alone, and chemical recycling technologies are in development across Europe. The Netherlands, where CuRe and Ioniqa are headquartered, dedicates considerable efforts to building up an industrial infrastructure for recycling. In Italy, two plastics recycling plants are in the works, at Garbo (ChemPet) and NextChem. The latter is applying a process developed by Swiss company gr3n, which is itself planning to build an industrial-scale facility, specifically for textiles, in Spain. In Switzerland, Worn Again and DePoly are seeking to scale up their depolymerising technologies for blended textiles. All told, these add up to a dozen future factories, in Europe alone. They could, depending on their level of advancement, become operational sometime between 2025 and 2027.

With three times more polyester fibre than PET packaging produced globally, they have their work cut out for them. Polyester is the most commonly used fibre in apparel, but it is often just one component of many. While production waste could, and should, be recycled using mechanical or thermomechanical methods, post-consumer apparel is an entirely different matter. It is believed that chemical recycling is the only solution to extract raw materials of value out of their variously blended materials.

With or without a solvent

Most chemical recycling technologies depolymerise polyester back into its original monomers using a solvent (such as methanol and glycol). They either extract monoethylene glycol (MEG) and purified terephthalic acid (PTA), or MEG and dimethyl terephthalate (DMT); both combinations can be repolymerised into new polyester filaments. But some do not use a solvent (solvolysis has come forward as another umbrella term for chemical recycling). Alternatives can be gr3n's microwave-based method, or enzymes, as at Carbios.



Swiss start-up DePoly has developed a chemical recycling process that is said to operate at room temperature and standard pressure without requiring pre-sorting, pre-washing or removal of contaminants.

CREDIT: DEPOLY

Maurizio Grippa, founder and CEO of gr3n, has been working on MADE (Microwave Assisted Depolymerisation), for 15 years. It was the focus of an EU-funded research programme, Demeto, and is the solution chosen for a NextChem plastics recycling plant in Chieti, Italy. "The technology works well on PET packaging, but we found its efficiency on textiles to be not as good," says Mr Grippa. Feeling more concerned by the issue of apparel waste, he has spent the last two years developing a solution for textiles. The technology developed by the Lugano-based company is said to have a relatively good tolerance for non-polyester content, up to 30%, a threshold higher than that of most other methods. "We can produce a food-grade polymer from used textiles," he insists. The technology is fast, in the order of minutes, and it is also a selective process that leaves other components intact. These are currently filtered out, but the company is working on valorising the unprocessed inputs, especially cotton.

Last year, gr3n announced plans to build its first industrial-scale plant capable of producing 40,000 tonnes of virgin-like PET. It will be managed by a joint venture between gr3n and one of its shareholders, Intecsa Industrial, a turn-key engineering and construction company based in Madrid. Three possible locations are under consideration, with construction expected to start in late 2024 and operations in 2027.

Using enzymes to break down polymers is seen as a promising biotech method, and French company Carbios is one of the most advanced in the field. A first commercial-scale biorecycling facility for PET packaging is in construction in Longlaville, in the east of France, adjacent to a polyester and PET production site operated by Indorama Ventures. "It will be able to process 50,000 tonnes of PET waste, which will be transformed into 45,000 tonnes of output in the form of PTA and MEG," Carbios CEO, Emmanuel Ladent, tells *WSA*.

The company is now making progress in applying its technology to recycle polyester fabrics. A pilot line for post-industrial and post-consumer polyester waste has recently been set up at its headquarters in Clermont-Ferrand. The automated and patented feedstock



French biotech company Carbios has developed a biorecycling technology that can break down polyester textiles, PET plastics, including food trays, into their original building blocks.
CREDIT: CARBIOS - AGENCESKOTCHPROD

preparation line is said to be able to treat 300kg of textiles per hour in a continuous process. It is the result of input from a research consortium launched in 2022 with sports and outdoor brands On, Patagonia, Puma, Salomon and lifestyle group PVH. "Our process produces very little waste with an overall yield of 90% at the demonstration plant scale. The small amount of waste produced is dry waste made up of anything that entered the process that is not PET, such as other plastics (polyethylene or polyamide, for example), contaminants and dyes. This represents 2% to 10% of the raw material," says Mr Ladent. The enzyme-based technology is believed to have a low carbon footprint, as it takes place at around 70°C. But the enzymes need time, in the order of hours, to do their job.

Low-energy processes

Chemical regeneration is often considered more energy-intensive than mechanical recycling, but companies in this field are finding ways to lessen their impact. Carbon dioxide emissions for the production of fossil fuel-based polyester are said to be around 2-2.2 CO_2eq/kg. A life cycle assessment (LCA) of Eastman's methanol-based polyester renewal technology from early 2022 found that it emitted 1.49 CO_2eq/kg. Documentation dating back to 2017 indicates a score of 1.28 for gr3n's microwave-based technology. Mr Ladent, at Carbios, says that PET producers can halve their greenhouse gas emissions using its biorecycled monomers.

The technology for recycling PET and polyester textiles developed by Dutch company CuRe is based on glycolysis, and does not completely depolymerise polyester, which gives it a low carbon footprint. "The polymer remains heated in a same loop and the process, which is continuous not batch, takes only a very limited amount of time," says Josse Kunst, chief commercial officer. He adds that "the further a polymer is broken down, the more energy is needed. Energy is also needed to build a polymer back up." A peer-reviewed life cycle assessment, taking into account the hydrogen and wind energy mix in the Netherlands, found that its method emitted around 0.27 CO_2eq/kg for post-industrial waste and 0.42 CO_2eq/kg for post-consumer waste.

In its pilot plant, the company tests different types of feedstock, including sportswear, carpets, mattresses, nonwovens and PET packaging. It has plans for a commercial scale facility, which, depending on funding, could be operational in 2025. "Our business case is based on packaging feedstock, and we intend to use that to invest in textile recycling. The first factory will run both plastics and textiles. Then we will see how the market develops and where the feedstocks are," says Mr Kunst. As opposed to other projects, CuRe's process, he notes, can function well as a small unit located close to big cities where waste is generated.

French start-up Recyc'Elit claims to have developed a chemical recycling process that is gentler than other methods, using methanol as a solvent. "It is a new generation methanolysis process that operates at a moderate temperature, less than 60°C, and at atmospheric pressure," Raouf Medimagh, co-founder and chief technology officer, tells *WSA*. This 'light touch'



Karim, left, and Raouf Medimagh, Recyc'Elit founders. The French start-up says its methanolysis method has a lighter touch, making it possible to recover other components from blended textiles.
CREDIT: RECYC'ELIT

technology allows Recyc'Elit to retrieve the other components in post-consumer textile waste, such as cotton, nylon and elastane. "Our goal is to recycle everything, even the most complex feedstock that others would tend to refuse, and find markets for all the components," he says. "This means that the feedstock we can use will be less expensive, which could be an advantage in the future when competition for pure polyester post-consumer clothes will be high."

Founded in 2020, the company has recently raised €3.2 million from the city of Lyon led by venture capital firm Demeter, France 2030 and other funds. This will allow it to scale up to 10 tonnes per year by the end of 2025. Recyc'Elit's demonstration unit will be installed in USIN, a former Bosch factory in Venissieux, near Lyon. It will have a starting capacity of 10 tonnes per year and measures 1 cubic metre in size, making it a compact solution. The recycling process delivers the two monomers DMT and MEG, and its yield is in the range of 80-85%. "Our conversion rate is 100%, as we recover nearly 100% of the polyester input," says Mr Medimagh. Feedstock preparation is also light, as he says: "Our process has a good tolerance for hard points". Its timeline for the future is to achieve a capacity of 100 tonnes per year in 2026-27 and a full ramp-up phase of 10,000 tonnes annually from 2028.

Swiss start-up DePoly recently raised funds to build a demonstration plant, expected to be operational in 2024, and a 50,000 tonne per year commercial facility is in the pipeline for 2027. BASF Venture and Beiersdorf contributed to a seed financing round of CHF12.3 million (€13 million). The technology developed by DePoly delivers MEG and PTA. It is said to operate at room temperature and standard pressure, with minimal pre-processing of feedstock.

Larger scale projects

As mentioned, large-scale chemical recycling facilities for PET and polyester are in the works in France. Eastman, a US-based producer of polyester and manmade cellulosic fibres, is building a plant in Saint-Jean-de-Folleville, in the west of France, where it will apply a methanolysis method it calls Polyester Renewal Technology. It represents an investment of €850 million and is expected to have a capacity of 110,000 tonnes per year when it comes on stream in 2026. Eastman plans to focus on difficult-to-treat waste, citing coloured PET packaging and polyester carpets as feedstock. French chemicals group Suez and Canadian company Loop Industries will be setting up a factory in Saint-Avold, in the east of France, a €450 million investment and a planned capacity of 70,000 tonnes per year. Loop's technology uses methanol as a solvent and delivers DMT, as does Eastman's, but the company claims that it operates in low heat conditions and with "no added pressure".

Accelerating Circularity, a non-profit whose mission is to develop textile-to-textile recycling at scale, has set up a working group for chemical processes. Members of the Alliance of Chemical Textile Recyclers (ACTR) include Eastman, Worn Again, Circ, Gr3n, CuRe, and The Lycra Company, along with companies that regenerate cotton into manmade cellulosic fibres such as Lenzing, Renewcell, Infinited, Sodra and pulp supplier Sappi. In addition to its goal to increase the amount of textiles that are recycled, it also seeks "to inform the industry from a recycler's point of view," says Karla Magruder, Accelerating Circularity president and founder. The problem with polyester, she points out, is that it is primarily produced in Asia, while waste is mostly generated in the global north. "At this stage of the game, we can get enough material to the recyclers that are mostly in pilot or demo phase."

As with all the companies surveyed, she expects the implementation of EU Green Deal directives to increase feedstock quantities. Major drivers would be the separate collection of household textile waste, with the roll-out of the European Waste Directive planned for 2025, and extended producer responsibility schemes for companies that sell clothing in Europe.

It will take time for these measures to be written into law across the bloc's 27 members. It will also be years before the dozen or so chemical recycling facilities for textiles that are in the works begin to run. This is an exciting period for the field, says Mr Kunst, at CuRe: "It will then be possible to assess what technologies are the most mature." But he believes that the period from 2027 to 2030 may be even more exciting. "That is when we will see which companies will be building their second and third plants."



Since 2022, German sportswear brand Puma has been introducing chemically recycled polyester made from old kits in the jerseys worn by the football teams it sponsors. Starting this year, it plans to make all of its jerseys from Re:Fibre, a polyester made from factory offcuts, faulty goods and discarded clothes that have been depolymerised.
CREDIT: PUMA

RISE TO THE CHALLENGE

Spiber's Brewed Protein is the first purely biotech fibre to be developed on a commercial scale. Fellow Japanese company and long-time partner Goldwin has played a crucial role in bringing the innovative fibre to market.

Biotech breakthrough

Twenty years is, roughly, the time it has taken to bring the first 'fermented' fibre to market. Spiber's founders Kazuhide Sekiyama and Junichi Sugahara met in 2004 when studying bioinformatics at Keio University's Institute for Advanced Biosciences, in Tokyo. They founded Spiber Inc in 2007 and the company, which now employs a staff of nearly 300, has since broken much ground to produce a protein-based bacteria-brewed polymer that can be turned into a textile fibre. It calls the product Brewed Protein. Spiber is not alone in this effervescent (pun intended) field, but few have scaled up. Genomatica, which has developed a biotech production process for caprolactam, a building block for polyamide, is the only example that comes to mind. Other companies seeking to biofabricate silk-like materials, AMSilk in Germany and Bolt Threads in the US, appear to have transitioned to cosmetics and medical applications.

The process of turning a polymer in powder form, which is the substance that comes out of Spiber's fermentation vats, into a solution that can be spun into fibre and then knitted or woven into a fabric, is one of many challenges that the company has successfully overcome in recent years.

Protean proteins

The company's scientific teams have dedicated extensive research to the identification and modification of protein-producing microorganisms. "They investigated the smart protein materials found in nature, such as those in the beak of an octopus, in sheep's wool, in spider silk, and in the legs of grasshoppers," says Spiber executive vice president, head of sustainability and European manager, Kenji Higashi. He joined the company in 2013, having also studied bioinformatics at Keio University with the founders. "Our team has analysed thousands of protein materials from nature and this has allowed us to acquire a large database of knowledge," he says. From this, the company "synthesises the DNA that produces a protein, and injects it into microbes" he adds. The company has thus "created a platform" for making new materials.

In addition to textile fibres, which Goldwin has been experimenting with since 2015, Mr Higashi says the company's innovation pipeline includes several other possible materials, including fibres with high levels of elasticity. A moisture-permeable waterproof membrane and a possible alternative to leather composed of 'structural protein materials' are in the works, through a partnership with Komatsu Matere, a Japanese textile manufacturer that might also decide to invest in Spiber.



Spiber's Brewed Protein fibre has featured in performance outerwear created by its long-time partner Goldwin.

CREDIT: GOLDWIN X SPIBER

Plant-based production process

Spiber's fermentation is robust, says Mr Higashi, "as it can take any type of starch feedstock." The company's first industrial brewery, which is located in Thailand and began production in 2022, is designed to use primarily sugarcane. The decision to install the first plant in Rayong, some 100 km south of Bangkok, was motivated by its proximity to sugarcane farms. Spiber buys the sugar used to feed the microorganisms from Bonsucro, a sustainability- and socially-minded sugarcane platform. A future facility to be built in the US, in a partnership with ADM, would use dextrose from corn, cultivated using regenerative practices. But the company's vision is to shift its sourcing from edible material to agricultural waste in the future.

Spiber has been working with ADM, a Chicago-based agricultural processing company with expertise in fermentation, since 2019 to fine-tune its process and help scale it. A plan to produce Brewed Protein polymers in ADM's industrial campus in Clinton, Iowa, was announced in 2020. The timeline for its actual launch has yet to be set but should happen in the next few years, says Mr Higashi.

Improving the productivity and efficiency of the brewing process, including the microorganisms themselves and other production parameters is another area of constant research. "Fermentation processes have been optimised over the years and it is possible to improve the yield and speed of processing. We can, for instance, boost microbe growth to achieve higher efficiency," he says. Like many biotech companies brewing various new substances, including plant-based meat alternatives (also protein), manufacturing in high volumes has proved tricky. "The tanks are a challenge to scale. It is one thing to produce in a multiple-tonne scale, and quite another to produce in multiple hundred tonnes," he tells *WSA*.

Case in point, the Spiber's Thai factory is fully operational, but not at full capacity. Its stated goal is to achieve a capacity of 500 tonnes per year. Mr Higashi says it is now running at 100 tonnes per year, with production gradually increasing. The powder made in this facility is then shipped to the company's plant in Yamagata, Japan, where it is dissolved and spun into yarn.

Manmade protein polymer

Spiber's Brewed Protein is a new fibre, one of few to come to market since the invention of synthetics. The introduction of any new material designed for apparel end-use immediately raises the question of what its composition label will indicate. "The polymer is natural, as it is derived from plants, but the production process is synthetic, as the powder is transformed into a dope for wet spinning. It is thus similar to viscose, or rather lyocell, as the solvent is not discharged but remains in a closed loop," Mr Higashi tells *WSA*. "In that sense, our Brewed Protein fibre is a semi-synthetic. But I don't think the industry has reached a consensus on how to describe a fibre like ours. It is technically a manmade protein fibre, just as viscose is a manmade cellulosic fibre." Casein, he goes on to say, is another manmade protein fibre that is derived from milk, and protein fibres can also be made from soybeans. Azlon was, back in the day, the technical name for this family of fibres. The term may not ring any bell with 21st century consumers, but it is nonetheless the closest officially recognised name garments made from Brewed Protein fibre could carry.



The innovative fibre has been used to make knitted and woven fabrics.

CREDIT: GOLDWIN X SPIBER

Its protein base makes Spiber's fibre similar to natural protein fibres such as silk, wool and cashmere, and it is said to deliver the same softness, comfort and breathability. For its first, preliminary LCA, based on the company's engineering plans, Spiber chose to compare the impacts of Brewed Protein with those of Mongolian cashmere and Australian merino wool. The LCA was conducted by a third party and critically reviewed by university professors, in line with ISO standards, says Mr Higashi.

The cradle-to-gate comparative LCA found that the potential environmental impact of a forward-looking Brewed Protein fibre was significantly lower than that of the two natural fibres. This, Spiber claims, was largely due to the small environmental impacts of inputs for the production of the biotech polymer (primarily plant crops and renewable electricity).

Commercial ranges

Goldwin, a manufacturer of performance apparel, has been turning the innovative fibre into physical products for years now. This autumn, a



Goldwin general manager Takuya Kinemi presenting the features of the capsule collection available for purchase in a pop-up store in London this autumn.

CREDIT: WTP

range of iconic Goldwin garments made from Brewed Protein fibre were available for purchase during a two-day pop-up shop in London's trendy Soho district.

Goldwin's general manager, Takuya Kinemi, was present in London and confirmed the company's staunch support for the biotech material. "Up till now we were only able to make limited editions made from Spiber's Brewed Protein," he says, mentioning The North Face's Moon Parka, of which 50 units were produced in 2019, and The Sweater, available in a run of 80 items in 2020. "Now, we can finally present the first real collection at commercial scale," he says.

The collection included a sweater made from a blend of 60% Brewed Protein, 25% wool and 15% nylon with a raised ribbed like structure. Other items included a three-layer laminate jacket and raincoat, a matching denim jacket and trouser, a fleece sweatshirt and a down filled shirt-jacket all featuring varying proportions of Brewed Protein fibre in their fabrics. "We chose to make our most iconic products from our Goldwin-managed brands because they are timeless, universal pieces that are easy to wear. These are garments that people will not tire of and will therefore be more sustainable," says Mr Kinemi.

Goldwin's general manager sees great promise in Spiber's Brewed Protein as he believes it has the potential to replace nylon and polyester. The first real collection was made from fabrics that have all passed common tests for colour fastness and resistance, but he admits that using a new fibre always presents challenges. Dyeing the cream-coloured yarn that Spiber produces has been one issue. "Sometimes dyes commonly used for silk or wool will work, and sometimes, they won't," he tells *WSA*.

> **"Spiber has a solution that extends beyond the benefits of the fibre itself and can have an impact on society."** TAKUYA KINEMI, GOLDWIN

Tackling these challenges has been central to the partnership between the two companies, and proof of their shared values. Mr Kinemi notes: "We felt a need for change. We cannot carry on business as usual, as our activities do too much damage to the environment". Spiber's artificial proteins make a strong thread, ideally suited to Goldwin's performance-oriented ranges. "We saw that Spiber had a solution that extends beyond the benefits of the fibre itself but can have an impact on society," he adds. Though the new fibre has been tremendously expensive to develop and remains costly to produce, Goldwin did not pass on the full added price to consumers in its first commercial offering. But, as Mr Kinemi insists, "this it is not just about money. We are investing in the future, we are co-creating the future. We ask our customers to think about their purchases. And, in time, when volumes go up, prices will go down."



The crew neck sweater is made from a blend of 60% Brewed Protein, 25% wool and 15% nylon.

CREDIT: WTP


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NEWCOMERS

Ambercycle looks to have received a game-changing boost in its bid to begin commercial-scale production of regenerated polyester fibres.

Time for regeneration

Regenerated polyester developer Ambercycle has entered into a new, strategic partnership with fashion group Inditex. Los Angeles-based Ambercycle takes end-of-life textiles and uses molecular regeneration technology to produce new polyester fibres from them for use in new garments. It uses the brand name Cycora for yarns and fabrics developed from the regenerated polyester.

Under the terms of the new agreement, Inditex will buy "a significant share" of the annual production of Cycora for a period of three years and the Spanish clothing group has said it will spend more than €70 million as part of the agreement. Initially, this money will allow Ambercycle to build its first commercial-scale production facility and it has said it aims to begin production at that new factory in 2025. Inditex will then aim to incorporate significant volumes of Cycora into its fashion collections in the three years that follow.

To demonstrate the potential that it believes Cycora has, Inditex has already developed a prototype capsule collection for its Zara Athleticz sports clothing line, with garments that contain up to 50% Cycora.

Ambercycle's chief executive, Shay Sethi, says the company's partnership with Inditex represents "a monumental leap forward" in the fashion industry's quest to achieve "circularity at scale".

An eco-system to build

The molecular regeneration technology it uses is chemistry that separates fibres from one another, and once the fibres are separated the next stage in the process is to purify and recover the raw materials, which can then reconstitute new yarns. The California-based company has told *WSA* that it has begun with a focus on polyester because this is the most-used fibre in fashion. Ambercycle insists that its technology is "a foundation on which a circular ecosystem can be built" and that it will be possible to use it "to regenerate all the different materials in our closet".

It warns, however, that for this to happen, "extensive ecosystem development" will be necessary and it envisages four steps on this road. The first is obvious: you have to save clothes from landfill at end of life by collecting them for a much more worthwhile purpose.



Prototype running gear made from Cycora fabric for Zara Athleticz. A multimillion euro investment from Inditex, and a commitment to use Cycora in its garments, will make commercial-scale production feasible faster for Ambercycle.

CREDIT: INDITEX

Before the second step, you have to prepare these textiles for molecular regeneration by removing buttons, zippers and other hardware, and then shredding the material. The pieces of fabric go into reactors for purification, first separating (if the material construction contains a blend) cotton or spandex or other fibres from the polyester and then removing dyes, additives and other textile finishing products. The polyester fibres that emerge from this process are further purified at a molecular level and reconstituted into, Ambercycle insists, virgin-grade pellets.

From these pellets, partners will then be able to spin new yarns and produce Cycora fabrics for use in garments, as Inditex is intent on doing. And at the end of those new garments' useful life, the fourth step on the road to establishing the eco-system that Ambercycle envisages is for the process to repeat itself.

Chemical reaction

"We predict that our regenerated polyester will offset close to half the emissions associated with virgin polyester production, once we reach commercial scale," Ambercycle states. Counting also the carbon emissions avoided by averting incineration or dumping of clothes in landfill, it insists that the environmental benefits far outweigh any environmental plus that supporters of the current traditional system of using petroleum-based textiles might point to.

Although it uses chemistry to produce its new raw materials, it chooses to use the term molecular regeneration to describe the process it has developed, distinguishing it from the chemical recycling practices already in place in many parts of the industry. For Ambercycle, chemical recycling implies high-temperature processes that have a higher environmental impact and produce lower-quality output.

"Our process involves lower temperatures and places emphasis on producing high-quality, like-new material as the output," the company insists. "As this space grows and innovations are introduced, we need terminology that distinguishes new technologies, based on their own attributes." It believes its system for creating virgin-grade materials without downcycling, leading to new garments from old, merits the different name it has chosen.

A 'de-risked' scale-up

It has been using this technique in a pilot production facility it set up in 2021; this facility has the capacity to process textile waste that would have the equivalent volume of 15,000 T-shirts per day. Ambercycle calls this a "pre-commercial level of material". It has developed the process as it has gone along, work that it says has "de-risked the scale-up" it is now preparing and has helped it design its first commercial plant, the building of which Inditex's investment will make possible. The Los Angeles-based company says it plans to make an announcement about the new plant in the near future.



Textile waste makes regenerated polyester, the polyester makes Cycora fabric, the fabric makes garments, and then the process repeats itself.
CREDIT: SAUCONY

Sticking with its T-shirts metric, it says the move to a commercial-scale plant will take the volume of textile waste it can process each day from 15,000 T-shirts to 250,000. The feedstock supply it will secure to turn into Cycora yarns and fabrics will include garments of all kinds, of course. Post-industrial as well as post-consumer waste will be part of this picture. Apparel that consumers have worn is coming into the Ambercycle feedstock cycle through collections that brand partners are carrying out, as well as from stocks of unsold second-hand clothing.

The post-industrial material comes directly from garment manufacturers, typically in the form of factory scraps. "Up to 15% of textiles intended for clothing end up on factory floors as cut scraps," the company states, "making this a valuable source of textile waste."

It says its efforts are ongoing to build up the supply-chain partnerships that make this flow of materials possible and to improve sorting techniques. Its objective in building good relationships with these end-of-life textiles partners is to make the practice of putting the material to better use simpler and more mainstream, to make giving it a second life second nature. Downstream, it also has Cycora-producing relationships with two yarn manufacturers in Asia, Shinkong Synthetic Fibers Corporation and Far Eastern Group. Brand partners using the fabric in their products include Saucony, Pertex, Nemo Equipment, Bestseller and H&M. It can now add Inditex to this list. What Ambercycle wants is for Cycora to become "seamlessly integrated" into these companies' production set-up.

> **"We hold primary data; thanks to this, we know what the emissions are for each hide"**
>
> BIRGITTE LANGER, SPOOR

Major emissions milestone

FOOTWEAR TECHNOLOGY

A decision to use leather made from traceable hides has allowed Icebug to cut in half the carbon emissions it attributes to the leather in its products.

Swedish footwear brand Icebug has achieved a substantial reduction in the carbon emissions it calculates for the nubuck leather it uses in products in its autumn-winter 2023-2024 collection. Its work with hide supplier Spoor and with tanning partner Ecco Leather has allowed it to cut those carbon emissions in half.

A specialist in creating shoes and boots for walking, hiking, running, especially in wintery conditions, Icebug insists it has had sustainability and eco-consciousness at the heart of its strategy since its launch in 2001. In 2018, it signed up for a United Nations initiative called Climate Neutral Now. This commitment involved three steps: embracing the need to measure greenhouse gas emissions, reducing those emissions as much as possible and, lastly, participating in carbon offsetting to compensate for emissions that it could not avoid. This encouraged the footwear company to speed up initiatives it already had in place to improve environmental performance. By February 2019, it was able to announce that it had become not just climate-neutral, but climate-positive.

Appetite for innovation

It has continued to look for further improvements, including in its material choices and it was this quest that brought Icebug into partnership with Ecco Leather and Spoor. Ecco Leather had already been its supplier of nubuck for footwear uppers for years and Icebug was a vocal supporter of innovations that the leather manufacturer brought into its production set-up, including DriTan.

Last year, the chief executive of the Ecco group, and former chief executive of its leather division, Panos Mytaros, told our sister title *World Leather* that he feared the company's DriTan innovation had received less attention than it deserved. Ecco Leather launched this new tanning technology in 2018, saying it would allow it to save 250 million litres of water per year at its tannery in the Netherlands. DriTan makes this possible by using all of the available moisture already present in hides to lower water consumption.

If the reaction to this advancement in some quarters has disappointed Mr Mytaros, he can level no complaint at Icebug; the Swedish footwear brand took the DriTan message on board from the start and has shared it enthusiastically with consumers. This message now includes a claim from a lifecycle assessment (LCA) exercise that Ecco Leather has carried out that DriTan leather's CO_2 emissions are 34% lower than those of chrome-tanned leather.

Traceable hides

Icebug has now taken this further, reaching more deeply into the supply chain, by announcing that, from its autumn-winter 2023-2024 collection onwards, the nubuck that Ecco Tan produces for its footwear will be processed not only using breakthrough technology such as DriTan, but from traceable hides. These will be supplied by Spoor.

Based in Denmark, Spoor's specialism is supplying semi-processed, totally traceable hides. Spoor launched in September 2020, using a laser-technology based system for marking and identifying hides. This has allowed its partners in the finished leather manufacturer community, including Ecco Leather, and finished product brand customers, now including Icebug, to pinpoint exactly where the leather in a specific item comes from. Footwear brand Roccamore, also from Denmark, is among the companies that quickly picked up on the benefits of using the material that Spoor markets as Nordic Traceable Leather.

Markings remain

Semi-finished leather producer Scan-Hide is the organisation behind Spoor. It is some four years now since Scan-Hide chief executive, Michael Sondergaard, spoke at a workshop on traceability at the Lineapelle exhibition in Milan and said its work on developing a laser technology-based system for marking and identifying hides was



On solid ground. Icebug is one of the first finished product brands to incorporate new, detailed LCA data from Spoor into its messages to consumers. Its calculation for carbon emissions of the leather it uses has now reduced by half.

CREDIT: ICEBUG

almost complete. Spoor has proved that the system works; the laser markings on semi-finished leather leaving Denmark remain intact throughout the retanning and finishing processes. With careful data collection and record-keeping of what happens when the finished leather moves to customers' manufacturing facilities for cutting and for use in products, brands can connect the upstream supply chain data to the boots, shoes, bags and sofas they want to bring to market.

On the day of his presentation of the idea at Lineapelle, Michael Sondergaard said that he was convinced consumers, especially younger consumers, wanted to know more about the products they buy. He said Scan-Hide's traceability system would "add to the story". Since August last year, Spoor has been adding even more to the story by making detailed information about the carbon footprint of the leather it supplies available to customers.



Nordic Traceable Leather is traceable at hide level as a result of the laser technology-based identification system that Scan-Hide put in place before the launch of Spoor. Detailed CO_2 emissions figures are now available at individual hide level.
CREDIT: SPOOR

Back to a single animal

Just as Spoor is part of Scan-Hide, in turn Scan-Hide is 98% owned by Danish Crown, a supplier of beef and pork to many markets around the world under the control of around 5,600 farmers. Danish Crown says sustainability is "the foundation of our new business strategy", which has the end objective of offering customers sustainably produced, high-quality meat. It has said it wants to be a leader when it comes to transparency and that, to this end, it is continuously working to strengthen its collection and analysis of data. "Through our unique set-up at farm level, we retrieve specific data points that help us in our work on sustainability each day, at the farms, in production, as people and employees, and in the final product on the consumer's plate," the meat production group says. Its efforts have allowed it to compile LCA data for each farm, taking into account scope-one (direct greenhouse gas emissions), scope-two (emissions from the energy required to run the farm's operations) and scope-three (indirect emissions that occur in the value chain).

Because Spoor also has access to this group information, it has now been able to work out the carbon footprint of its leather and make the details available for brands to use in their own product footprint calculations and customer communications. "We hold primary data," business development director, Birgitte Langer, explains. "We have access to the climate data the farmers collect and the system Scan-Hide developed for Spoor means we have traceability back not just to the farm but to a single animal. Thanks to this, we know what the emissions are for each hide."

Before and after

Icebug is one of the first finished product brands to take this new information and weave it into its narrative for consumers. It had calculated carbon emissions for the leather it used before this, but the footwear company's sustainability manager, Maria Munther, explains that it had to do so without any specific data from suppliers. Instead, it had to use available global average values from the Higg Materials Sustainability Index (MSI). Supplier-specific data makes the calculations much better, she says. As a result, Icebug can now compare before-and-after figures for the carbon footprint of the leather in its footwear. Its calculation for the leather it was using before was an average of 36.4 kilos of carbon dioxide equivalent (CO_2e) per kilo of finished leather. The leather it is using in its new autumn-winter collection, the Nordic Traceable Leather made from hides from Spoor, gives an average figure of 17.9 kilos of CO_2e. This means the decision to use traceable hides from Spoor has allowed Icebug to halve the carbon emissions it attributes to the leather in its products.

These figures are third-party verified (by an independent environmental consultancy in Denmark) and are compliant with the Product Environmental Footprint (PEF) methodology that the European Commission has proposed as a way of measuring environmental performance. Customers will be able to use the figures in their own LCA calculations. Spoor is also working with Worldly, the new name for the platform that hosts the Higg Index, to have the figures for Nordic Traceable Leather added to its database.

For Ms Langer, all of this points to important, real-world progress; it gives a starting point for calculating the carbon emissions attributable to Nordic Traceable Leather and the figures will, she insists, continue to come down because the Danish Crown farmers are working all the time to lower emissions further. Across Denmark, intense research is going on in laboratories and pilot exercises are taking place on farms, all with the aim of bringing down the carbon footprint of the entire Danish agricultural sector. This "responsible, ambitious farming" offers benefits to the leather industry in the shape of the lower carbon footprint figures Spoor and customers such as Icebug are now able to shout about, Ms Langer concludes.

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Vivo is working to create an anatomically-correct last that accurately represents the human foot using extensive foot scan data. It plans to open source this once it is finalised.

ALL CREDITS: VIVOBAREFOOT

New tech for old values

SUSTAINABILITY

Vivobarefoot aims to tackle the vast amounts of footwear waste by creating 'scan-to-print', locally made custom shoes that wearers could treasure for longer.

Minimalist running shoe company Vivobarefoot is betting big on its latest project, Vivobiome, a scanning and 3D printing initiative that it claims could alter how people wear and feel about their shoes. Offering a perfectly fitting custom model, made locally and recycled at the end of life, this could reduce the number of shoes sent to landfill and create a circular model that other companies could emulate, it suggests.

It is ambitious, and potentially radical, but it is still at an early stage. The company is trialling the fit and function with 200 testers in the UK, who had their feet scanned in a London Vivo store using technology from Swedish company Volumental. "We are investing a lot of our human resources and finances into this project," Dulma Clark, impact investment and storytelling lead at Vivobarefoot, tells *WSA*. "Essentially, it all goes back to the way footwear used to be made: foot by foot, person by person, for your own body, for your own size, for your specific use."

Launched in 2012 by Galahad and Asher Clark – cousins and members of the UK's Clarks Shoes family – Vivobarefoot's philosophy is based on creating as close to a barefoot experience as possible, allowing the foot to flex naturally and feel in contact with the earth. All its products are designed to enable this natural connection, and the team studies and supports indigenous communities around the world as a way of preserving ancient techniques and providing inspiration.

Perfect ratio

As part of the background work on Vivobiome, the company analysed 1.5 million foot scans over a period of four years, trying to produce a program for automation. This was more complex than initially thought, and the team worked with suppliers to understand and replicate the ratios and the correct space inside the shoes. "After you scan, the shoe can't like just go on like a glove, it needs to have a perfect amount of space between your toes and the wall of the shoe, for instance," explains Ms Clark.

The company sought customers' help to test the fit and function, and was surprised when 2,500 applied for 200 places – "some wrote essays about why they should be picked," she comments. The idea is that the footwear can be bought as a one-off – a working price point is £250 – or pay an annual subscription and have the shoes replaced at intervals, with the wearer benefitting from a model of their feet that lasts their lifetime. They can choose to have the shoe fully 3D printed, or have a 3D printed outsole and a knitted upper, which 90% of the testers have selected.

In the future, technology allowing, customers could either go into a local shop, which will house a scanner, or they could scan their feet directly with an app on their phone. They would then select colours and materials, with the information relayed to a nearby manufacturer. For this pilot, a shoemaker in Ireland has been selected, with a lead time of around 75 days. "Obviously, we can ship anything anywhere but the idea is to keep it circular, localised, self-sufficient; the materials, the warehouse, the manufacture. That's the principle we're trying to deliver," adds Ms Clark.

The scheme also involves a repair element, with the company working with Boot Repair Co in Leeds. It has also partnered US-based textile-to-textile recycling company Circ, which has pioneered a way to break down polycotton blends into raw materials, as part of a take-back scheme. Vivo plans to incorporate Circ's material into the upper of the Primus style, its best-selling design, by early 2025.

Other recent internal innovation projects include a pilot to see if stained returned footwear can be dyed with natural dyes. It will be selling these upcycled shoes through its takeback site, ReVivo, this year. The company also funded trials into natural materials, including mycelium-based foams, natural rubber foams, regenerative natural rubber cabling and laces and leather alternatives.

Future compost

At the Biofabricate Summit in Paris in January, Vivobarefoot announced a groundbreaking partnership with materials science company Balena. They have created what they claim is "the world's first barefoot, 3D-printed, industrially compostable footwear". The products will be made from a bio-based, industrially compostable thermoplastic that biodegrades. Their aim is to start selling the footwear in 2025. Until now, most 3D printing filaments have used conventional plastic materials. "We knew we needed to look for other options," says Ms Clark. "This one is extremely promising."

In 2023, Vivobarefoot sold just under 1 million pairs of shoes, up 29% on the year before. This translated to sales of £73.4 million, 49% higher than 2022's record of £49.4 million. It delivered earnings of £1.5 million, an increase of £1 million over 2022, making it the most profitable year to date and demonstrating its social conscious and philosophies are striking a chord with consumers.



The new platform creates an AI enabled model using photoreal visuals so customers can have a virtual try on. They can then choose to further customise the design and colour before sending it to print.

The Vivobiome tests continue, with some testers suggesting on social media that the soles in the first iterations could be more flexible. However, the company is aiming to produce 4,000 pairs of these custom designs this year. "Vivobiome is not just a new product," comments chief design officer Asher Clark. "It's a radical vision for a circular system, enabled by technology to reimagine manufacturing that takes it back to its roots."

MONGOLIAN MAKERS GAIN GLOBAL PLATFORM

As part of Vivobarefoot's support of indigenous footwear and communities, its latest launch is a slipper with a soft leather sole made through the charity Asral. Its Made In Mongolia (MIM) project trains workers to produce comfortable traditional shoes using local wool, providing income, education and purpose. It supports local communities in Mongolia, where a third of the population lives below the poverty line, according to the World Bank.

Dulma Clark was born in Siberia as part of the Buryat indigenous community. As a child, she wore similar wool slippers as outdoor shoes, as the climate there is cold but dry. A pre-pandemic visit to Ulaanbaatar to see the shoemaking workshops ignited the desire to add wool slippers to its range that already includes sandals from Africa and snowboots from Canada. After an initial order of 2,000 pairs, Vivo has now ordered an extra 6,000. As well as supporting the workers, schools and healthcare provisions, funds raised will support 100 children in three state-run orphanages. Vivo is forgoing profits on the collection so the money feeds back into Asral.

Dulma and the team will be heading back to Mongolia this summer to check on progress and learn more. The next idea is to boost these projects by setting up "mini expeditions", inviting stakeholders and journalists, or perhaps the wider public, to visit the workshops and learn more about traditional footwear making. They are currently recruiting "knowledge holders" and potential expedition leaders in each of the communities they work with, who can educate on a wide range of local skills and traditions. "The idea is to connect these locations not just from a craftsmanship perspective but offering 360-degree nature reconnection experiences."

Next, Dulma wants to create a dedicated section on the Vivo website through which all the indigenous collections will be sold. It will become a space for consumers to learn about the projects, hear the stories of the workers and understand how the profits support families and nurture the skills.

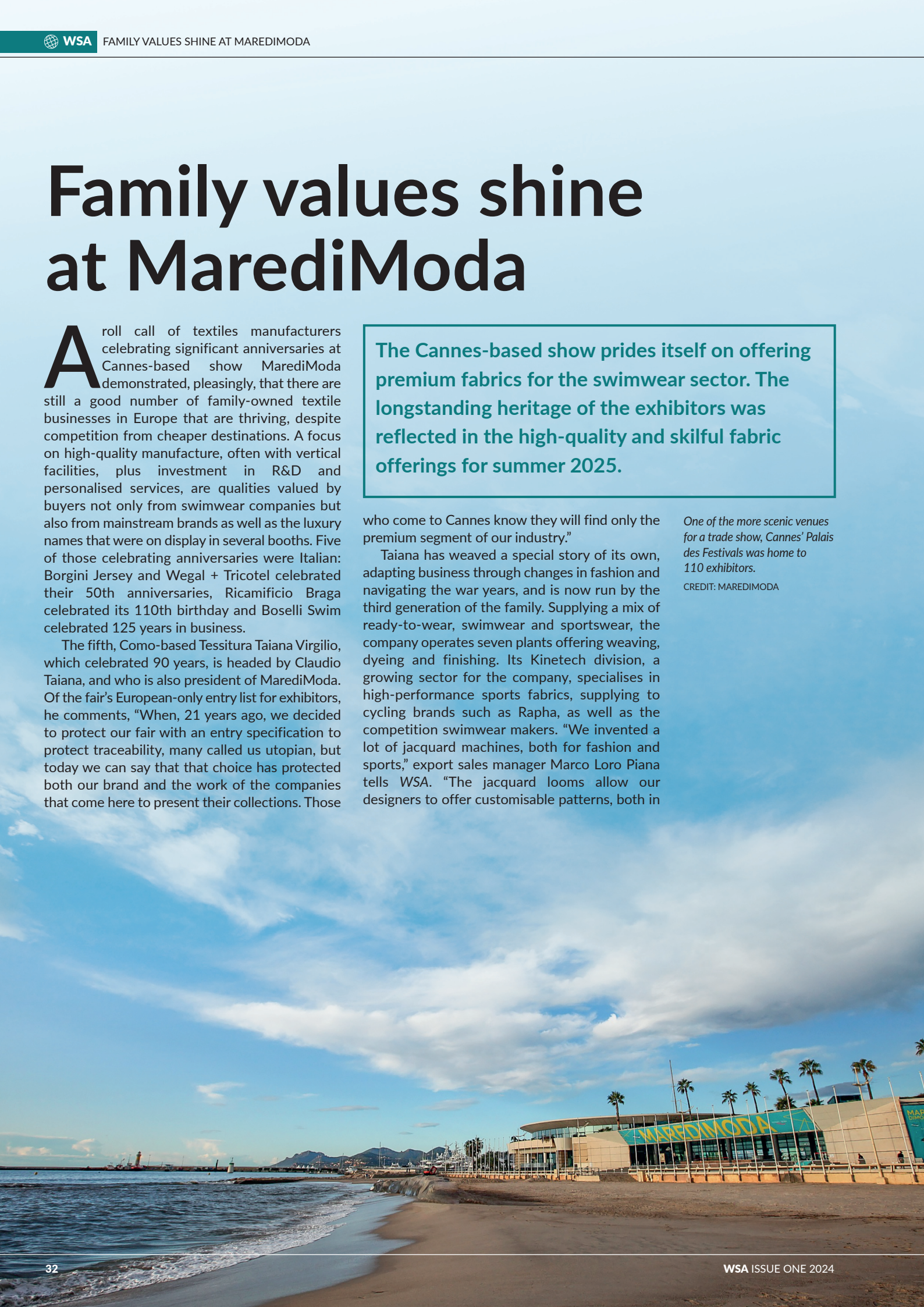
Family values shine at MaredíModa

The Cannes-based show prides itself on offering premium fabrics for the swimwear sector. The longstanding heritage of the exhibitors was reflected in the high-quality and skilful fabric offerings for summer 2025.

A roll call of textiles manufacturers celebrating significant anniversaries at Cannes-based show MaredíModa demonstrated, pleasingly, that there are still a good number of family-owned textile businesses in Europe that are thriving, despite competition from cheaper destinations. A focus on high-quality manufacture, often with vertical facilities, plus investment in R&D and personalised services, are qualities valued by buyers not only from swimwear companies but also from mainstream brands as well as the luxury names that were on display in several booths. Five of those celebrating anniversaries were Italian: Borgini Jersey and Wegal + Tricotel celebrated their 50th anniversaries, Ricamificio Braga celebrated its 110th birthday and Boselli Swim celebrated 125 years in business.

The fifth, Como-based Tessitura Taiana Virgilio, which celebrated 90 years, is headed by Claudio Taiana, and who is also president of MaredíModa. Of the fair's European-only entry list for exhibitors, he comments, "When, 21 years ago, we decided to protect our fair with an entry specification to protect traceability, many called us utopian, but today we can say that that choice has protected both our brand and the work of the companies that come here to present their collections. Those who come to Cannes know they will find only the premium segment of our industry."

Taiana has weaved a special story of its own, adapting business through changes in fashion and navigating the war years, and is now run by the third generation of the family. Supplying a mix of ready-to-wear, swimwear and sportswear, the company operates seven plants offering weaving, dyeing and finishing. Its Kinetech division, a growing sector for the company, specialises in high-performance sports fabrics, supplying to cycling brands such as Rapha, as well as the competition swimwear makers. "We invented a lot of jacquard machines, both for fashion and sports," export sales manager Marco Loro Piana tells *WSA*. "The jacquard looms allow our designers to offer customisable patterns, both in



One of the more scenic venues for a trade show, Cannes' Palais des Festivals was home to 110 exhibitors.

CREDIT: MAREDIMODA



Buyers analysed upcoming fashion themes through MaredíModa's trend zones.
CREDIT: MAREDIMODA

ladies' and men's swimwear. In sports, we use jacquard weaving and special blends to produce aerodynamic features and compressive patterns."

Its new offerings include Blu 2025, a special collection for the 90th anniversary featuring a range of "green yarns", reflecting a focus on the entire value chain, from energy to finishing. "Our specialty is 3D elastic, something you can only create with woven fabrics, but it's been increasingly blended with shiny lurex. We do the same with a dobby woven stripe with a special lurex. People want things that stand out," says Mr Loro Piana.

Three years ago, the company began transitioning its yarns to offer recycled options, and is now in a position to offer 90% of its collections with some percentage of recycled content. Mr Loro Piana admits it wasn't an easy process, as they work with a lot of complicated blends. "We had to adapt our dyeing methods to make the colour consistent," he says. "But our philosophy doesn't mean just using recycled fabric, it starts from the beginning. For instance, our production plant is covered by solar panels and use a sublimation print system that saves water."

Lifestyle concept

This sentiment is echoed by Eurojersey, which specialises in knitted constructions for activewear, swimwear and underwear. It is known for its Sensitive brand and produces 13 million metres of fabric per year from a facility north of Milan. By operating a single plant, from weaving and dyeing to finishing, printing and bonding, the company can tightly control its processes to reduce water and energy. It began its sustainability journey in 2007, when "no one else was even talking about it", says Michela Delle Donne, Eurojersey's head of marketing.

As part of this, for the last three years it has published a Footprint Report, detailing progress such as a reduction in water consumption per unit of fabric every year since 2015. It is also collaborating with yarn suppliers and plastic manufacturers to address end-of-life options. "We are able to track and measure our impact, but also to invest in new technology to save water, energy and resources in general," explains Ms Delle Donne. The company has also invested in welfare for its 220 staff, including providing a gym where they can both relax and test the fabrics.

Eurojersey's branded Sensitive fabrics use a patented knitting technique to create breathable and quick-drying fabrics with 3D elasticity and shape and colour retention. The swimwear range offers 50+ sun protection and is resistant to chlorine, salt water, sunscreen and heat, and has been used by brands including Burberry, Zimmerman and Tori Burch.

Its latest collections offer designs reminiscent of Caribbean carnivals, 1970s California and the Orient. They include a fabric construction previously used for athleisure fabrics, offering a more textural, ribbed 3D effect, as well as a shiny collection that can be plain or printed. A new delavé effect makes fabrics feel "vintage" and is ideal for customised garments. "Swimwear is becoming a lifestyle concept," explains Ms Delle Donne. "It's not just a seasonal collection. Now we have started travelling again after the pandemic, you can wear it all year."

Shine on

This is a clear message coming out of the show – "swimwear is not just for swimming" – highlighted by textiles consultant David Shah but also promoted on the booths. A resurgence of swimming costumes instead of bikinis means consumers are purchasing more but also means swimwear often needs both performance and fashion qualities. "If it's only worn on the beach, comfort and style is key. Swimwear for competition swimmers needs to resistant to many hours in chlorine; swimwear for volleyball players needs to resist perspiration and sun cream. In our collection,



There was no shortage of glitter, shine and sequins on display.
CREDIT: WTP

we have 70 fabrics, serving all these needs," says Matteo Schieppati, CEO of Wegal + Tricotel.

Established in 1973, Wegal + Tricotel initially produced elastic fabrics for swimwear and lingerie, but has diversified into sportswear and workwear fabrics, knitting and dyeing in one plant near Saronno, north of Milan. Most raw materials and yarns are sourced from Europe; "We think the best way to take care of the environment is short supply chains," says Mr Schieppati.

Each year, the company chooses a different focus for investment: new dyeing machines, reducing water use by 40%; Industry 4.0, to optimise production and processes; this year it is investing in a new heating systems and next year the cooling systems will get an overhaul. "One of the benefits of being a small company with 50 years' experience is flexibility. We like to work closely with customers to produce unique products and can produce small quantities for trials," explains Mr Schieppati. For the first time in years, shine is back, he adds. "For 20 years, customers told us that shiny will come back, but it never did. They always wanted matte. Now, we are seeing a tendency for shiny."

Lurex and lustre

Shine was also on show at Billon, a 100 year-old French company based near Lyon, which specialises in jacquard knits for athleisure and swimwear. "We use a lot of lurex, it's very popular at the moment," says Xavier Minsac, commercial director. And although the company is receiving increasing requests for recycled fabrics, he admits it can sometimes be harder to dye.

Milan-based Eusebio revels in novel yarns, creating two collections every year, with 60% of the business from ready-to-wear and 40% from beachwear and activewear. As part of its sustainability strategy, it invests in cotton from the Ivory Coast, supporting farmers and their communities, including funding a primary school. It offers a wide range of fabrics, including knitted constructions for in and out of the water; terry, foils and printed.

LYCRA ROUNDS CORNER ON RECYCLABILITY

Longtime sponsors of MarediModa, The Lycra Company used the event for the European launch of two fibres: Lycra Adaptiv Xtra and Lycra Adaptiv Black. Both build on the Adaptiv platform launched in 2021, which allows brands to make garments that offer a better fit. The modified polymer gives more stretch, giving a "second skin" feeling and, in theory, reduces online garment returns as they fit a wider range.

Adaptiv Xtra Life adds resistance to chlorine, heat, perspiration and sun creams, all of which break down spandex. Xtra Life resists up to 10 times more hours in the swimming pool. Adaptiv Black fibre, primarily designed for activewear, enhances black and dark fabrics. "We have spun some black pigment into Lycra Black; it keeps dark colours looking as though they're new for longer, so it helps prolong the useful life of the garment," explains Alistair Williamson, vice-president for Europe and South Asia at Lycra.

Adding durability is one of Lycra's key sustainability pillars, alongside a reduction in greenhouse gas emissions and end-of-life solutions. Recycling spandex has been one of the key sticking points, and something the company has been working on for years. "Products do break down eventually," says Mr Williamson. "Spandex is seen as part of the problem, we want to change that."

Blends with higher than 10% spandex cannot be recycled mechanically, as they clog up the shredding machines. Chemical recycling has proved problematical because of the nuances in Lycra's raw materials. In October, it announced "exciting results" from a project breaking down a fabric made from 70% polyester and 30% Lycra; both were recovered and spun again. "The fabric performed exactly the same. We were excited because we thought it was not possible," says Mr Williamson. However, he stresses that there is still a long way to go. Lycra is working with recyclers around the world to find technological solutions for various blends. "There's a lot that still needs to be done. What we want to convey is that Lycra shouldn't be the problem."

In the company's most recent sustainability report, it outlines an ambitious target to cut greenhouse gas emissions by 50% by 2030 and be carbon neutral by 2050. Among ways it will achieve this will be to swap to renewable resources at its manufacturing plants — for instance, its Maydown plant in Northern Ireland, which supplies to many of Europe's swimwear manufacturers, is transitioning to solar and wind energy, and working with its downstream suppliers to do the same.

Much should come from moving to biobased BDO as a raw material. The two main raw materials for Lycra are PTMEG (around 70%), which makes the soft part, and MDI (30%) makes the harder bit. Both derived from oil, the US company Qore is building a facility that will come on stream next year and will supply BDO – a precursor to PTMEG – from industrial corn, a move an independent analysis states could cut Lycra's carbon footprint by 44%. "We will have our first yarn being spun commercially by the end of next year and by 2025 we will start to convert our production over to it. Our plan is to convert everything, and move away from fossil fuels." Lycra first released a product made from corn in 2014 but Mr Williamson admits it was too early for the market; it is now garnering a lot of interest.

The company's tie-up with HeiQ to promote its cellulosic Aeoniq yarn is another pillar. "More and more, we want to try to work with people who are similar to us; they will benefit from our market reach and we will benefit from our having access to different technologies. HeiQ have developed some very exciting things. We'll probably see more of this in the future."

For summer 2025, alongside recycled polyester and polyamide, it is offering a collection made with biodegradable nylon, an innovative yarn that has a softener inside, making it degrade (under certain conditions) in two to three years. "We are presenting performance collections, as well as the lurex, glitter and shiny," says Eleonora Cimmino from Eusebio's design department.

The exuberant trend was highlighted by Mr. Shah, a style reflected by lustre, sheens, iridescence, wet look and high-tech cutting and shaping. But he also picked out four other trends: Conscious – craft-based looks favouring inclusive social practices and "kind" ingredients; Transformed – youthful, happy and exciting; At Ease – comfortable, plain, plant-based fibres; and Magical – made with botanic dyes and natural pigments and fibres. "Just like the entire textile supply chain, the beachwear, underwear and athleisure sectors have adopted an ethical, circular and responsible approach," he says. "The technology available today enables tremendous progress on the sustainability front as well as on fabric construction."

Cannes-do attitude

MarediModa rounded off with a catwalk show from student designers, finalists of the Link competition, using fabrics from exhibitors. The competition has provided a springboard for young designers into brands over the years, according to the organisers, and offers companies access to fresh talent. The winners were named as Monika Luczak from Poland (underwear), Iulia Anton from Romania (athleisure) and Laurine Achoui from France (beachwear).

> **"The best way to take care of the environment is short supply chains."**
>
> MATTEO SCHIEPPATI, WEGAL + TRICOTEL

While anecdotally a quieter show than the past two years, many confirmed MarediModa's place as an important date for swimwear, athleisure and underwear, with booths busy and buyers placing orders, and a multitude of accessories stands, perhaps indicating that we will see sequins, chains and decoration on swimsuits next year.

The MarediModa Creative Excellence Awards were presented to Colombian group Leonisa and US brand Sauvage. "We have selected two brands that produce very different styles but that are appreciated in every corner of the planet," says Mr Taiana. "Two brands that believe, like us, in product ethics and supply chain traceability."



DIALOGUE

Daniel Odermatt, brand director, Ventile

A storied past meets a sustainable future

Performance cotton fabric Ventile, initially made in the UK but now under the ownership of Switzerland-based Stotz & Co, marked its 80th anniversary in 2023. Its brand director, Daniel Odermatt, explains its new direction.

In 2023, Ventile formed a joint venture with the Egyptian Biodynamic Association to support its membership in making the transition to organic and biodynamically cultivated cotton. Can you tell us how this partnership came about and why it is important?

Egypt is a strategic partner for us as a producer of organic cotton extra-long staple cotton. We understand Egypt has a good reputation and it is ideal that it's not too far from our base in Europe. We were invited by Sekem, an organisation that focuses on organic produce and helps farmers convert from non-organic to organic production, to visit the ginners, spinners, and weavers, and it was immediately of interest to us. Through a sponsorship deal, we now support farmers through the conversion period, which can take four years. Our message is "Join the movement, love the environment, choose slow fashion", and so we wanted to do something that reflects this.

Is this where you will source your cotton from in the future? Can you get extra-long staple from everywhere?

In the future, it would be fantastic to be able to say that all of our cotton would come from these farms as we know the quality is very high. For now, we also use US Pima cotton which is excellent. Only 2% of the world's cotton crop is classified as organic, and only 2% of that is an extra-long staple source – so that 0.04% is what we use; it's a rare cotton fibre.

What's so special about Ventile? What important milestones have you reached?

From the extra-long staple cotton fibres, we produce extremely dense cotton fabrics. It's the densest cotton fabrics available on the market and



Daniel Odermatt, brand director at Ventile.
CREDIT: VENTILE



The Dr Martens 1460 boot, a special edition featuring Ventile L24 fabric in blaze orange and black.

CREDIT: DR MARTENS

the unique natural performance balances waterproofness and windproofness, while remaining breathable. In terms of milestones, expanding to recycled and blended fabrics as well as converting to PFC-free coatings were big steps in our history.

In 2018, Ventile launched an Eco range, featuring organic cotton and then recycled options. Why did you go down this route?

More than half the fabrics we sell now are from our Eco range, and 85% of these sales are from organic. The majority of the market is served by synthetic fabrics, but synthetic fabrics typically include microplastics, and nobody wants those in the environment. When people look for alternatives in natural performance fabrics, they find us.

Is it the brands that care about microplastics, or are consumers aware of the problem?

We are finding more and more that the consumers are aware of the problem. They are specifically looking for natural garments and garments made from natural fibres, and sodesigners are responding to that.

Your marketing promotes slow fashion, describing Ventile as "the antithesis of fast fashion". This is a movement that is gaining ground.

Absolutely. Our partners produce classic garments, not necessarily trend-led fashion garments, and they choose classic colours so they can be worn for many years.

Can you give us some examples of the brand partners you work with?

We work with brands across luxury fashion as well as in the outdoor market such as Stone Island, Gucci, Canada Goose, Calvin Klein, Hugo Boss, Loewe, Nigel Cabourn, Dr Martens, Converse and Jil Sander. Ventile fabric is used for outerwear, accessories, footwear, and even for horse coats and watch straps. We also still supply to the British and Swedish armies.

"We are finding more and more consumers are aware of microplastics. They are looking for garments made from natural fibres."

DANIEL ODERMATT, VENTILE

2022 was a record year for you, so how is Ventile growing?

The coronavirus crisis was of course a step back, as it was for everyone, but in 2021 we made a big step forward. I thought it might be to compensate the loss of the previous year, but 2022 was even better. We have tripled our sales in six years. In five years, we have increased our organic cotton usage from 20% to over 50% of our sales.

How does using recycled cotton affect the performance?

By its very nature, the fibres used in recycled cotton are shorter so the performance isn't exactly the same. With normal cotton, we reach 600mm of hydrostatic head [a measurement of waterproofness], and with the best recycled ones, it's 500mm, which is still very good.

You've expanded into Asia recently with new agents in South Korea, for instance. Where are your biggest markets?

It is a very exciting time for us and we can now say that geographically, we are in almost all the continents, except Africa. Our work with our partners in South Korea has been informative and



The Brynje Explore Ventile jacket 2.0 featuring Ventile organic.
CREDIT: VENTILE

has helped to support growth. Right now we have our sights set on additional activity in the US as well as continuing our great success in Europe.

Can you tell us a bit about Ventile in the footwear market?

The versatility of Ventile means that our fabric has been used by Dr. Martens. The fabric worked particularly well as part of the upper, with the brand choosing Blaze Orange and Black Navy. That was a nice collaboration, as we have a similar history. French brand Bonne Gueule, known for their sustainable practices, also chose the recycled cotton version for a recent collection.

Ventile must be recognised by the consumers. Is that something you're also trying to push?

It is great when we hear from our customers about their Ventile items. On social media, we recently featured a customer wearing a Ventile jacket from back in the 1970s. There are some avid fans of the fabric and it is always lovely to see; we would always encourage customers to get in touch if they have a story about Ventile as our brand is based on our heritage. Our partners also see this and love to use this message to promote their garments.

What are the priorities now? Are you working on anything new?

Our aim is to provide sustainable solutions for the next generation of designers. In the future we would look to be able to produce an entry-level fabric with a slightly lower price point, that is both sustainable, weatherproof and breathable. It is technically a bit challenging, we are not there yet, but this is one of my targets.

Is this something your customers are asking for?

More and more the topic of biodegradability comes up and we are getting more enquiries about this than ever before. It is clearly high on the agenda for consumers and brands in the textile industry.

LIFE-SAVING FABRIC GAINS NEW LEASE OF LIFE

Ventile's first job was to save lives. During the Second World War, British fighter pilots were sent on reconnaissance missions, taking off from merchant ships. But with no way to land back on the ships, ejecting into the sea was treacherous and the outlook was grim: only 20% survived the cold water. The Royal Air Force (RAF) realised they needed new clothing, and the Shirley Institute in Manchester developed the tightly woven material using extra-long staple cotton which proved a game changer for the pilots: once wearing Ventile, the survival rate jumped to 80%.

Ventile was widely adopted by the RAF and used all over the world. It featured in the first summit of Everest in 1953 and was worn by Sir Ranulph Fiennes when he crossed the Arctic and Antarctic from 1979 to 1982. The British Antarctic Survey Team also used it for years, in jackets and in tents, protecting researchers from the 140mph winds.

"One of the beauties of Ventile is it is breathable," explains Mark Burrows, who owned the Ventile brand from 2000 until his retirement in 2017. "Retired RAF pilots would ring up to tell me how good it was. The man-made fabrics that followed just didn't give the same comfort and breathability at altitude. Hearing people's stories who've been in the air with it or to the Antarctic makes you feel proud."

The fabric was initially woven in UK factories, in Colne and then at Talbot weaving in Chorley. But as the British dyeing houses went out business, it was sent to Switzerland for finishing, and a relationship with Stotz & Co was formed. It produced a similar product called EtaProof, and the companies later collaborated on the manufacture of the fabrics. When Talbot closed, its then production manager, Mr Burrows, took over the Ventile brand with a colleague.

"Until then, it was mainly focused on Ministry of Defence, outdoor and expedition wear," explains Mr Burrows. However, a meeting with a Nike executive catapulted it into the fashion and luxury sectors. "Companies began to put it in hats, jackets, bags and boots," he says. "From then, it grew at a rapid pace."

Shoe companies such as Converse and Clarks put in orders; King Charles wore a Ventile coat around Balmoral; actor Eddie Redmayne wore it on a magazine cover; singer Liam Gallagher's Pretty Green brand bought thousands of metres. "He loves it, he still wears it on stage," says Mr Burrows.

One of his principles was to keep the price the same for everybody. "I never discounted, no matter where they were from or the volumes. I believed the fabric was of good enough quality to hold its price. You devalue the brand if you start discounting, and our customers respected that."

The growth of Ventile brought closer collaboration between the UK side of the business and Thomas Stotz in Switzerland. When Mr Burrows retired, the decision to sell the brand name to Stotz was an easy one, knowing it was in safe hands. "Its origin dictated that it had to be top quality, and the important thing is it has not been cheapened with lower quality yarns."

In 2018, Stotz began to offer an Eco range: first with organic cotton, later moving into recycled cotton, hemp, lyocell and linen blends. In 2019, it launched a marketing campaign promoting its role in 'slow fashion', and in 2021, it moved to a fully PFC-free durable water repellent (DWR). Last year, it celebrated its 80th anniversary, testament to the lasting appeal of this high performing cotton fabric.



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