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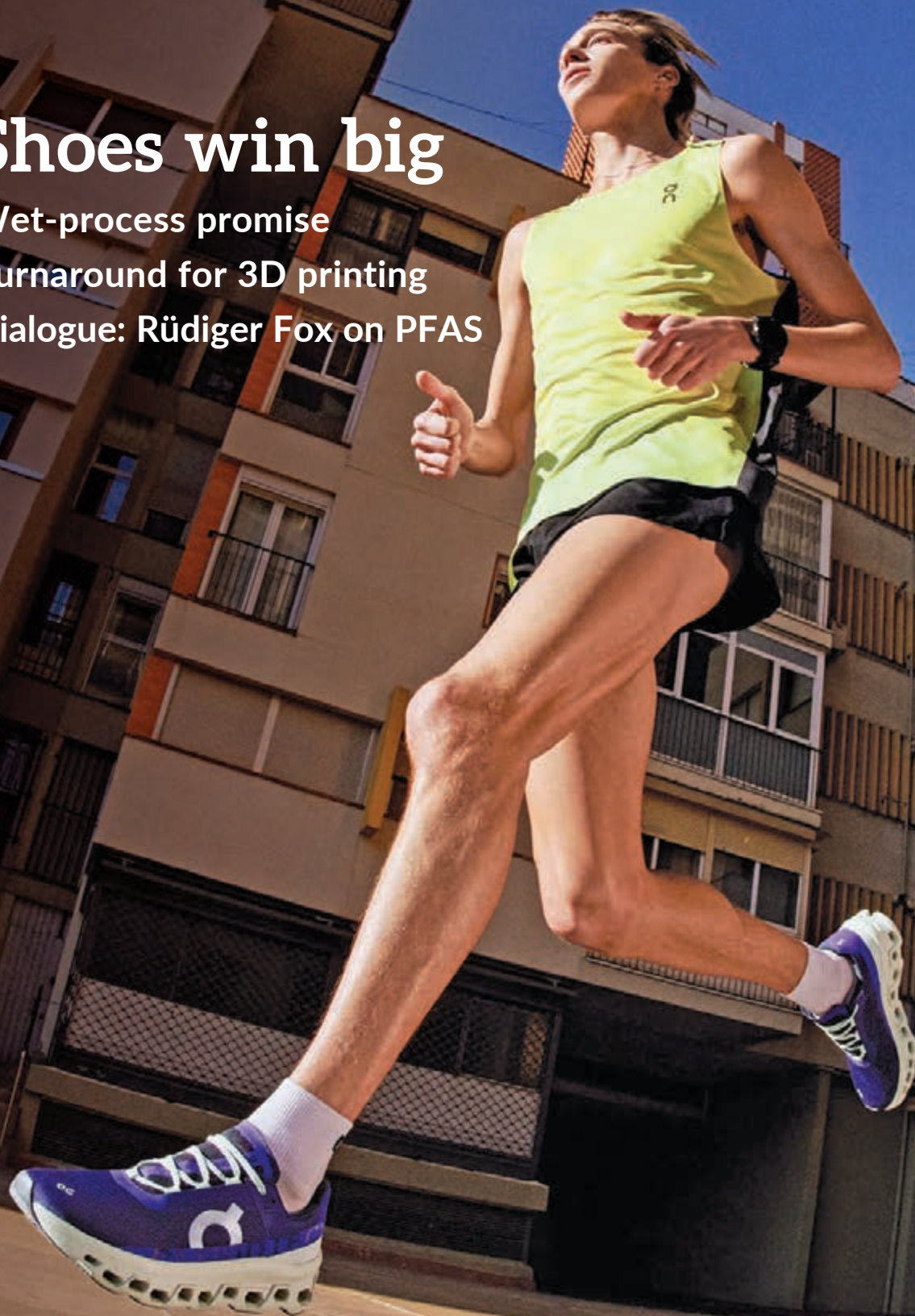
PERFORMANCE & SPORTS MATERIALS

Shoes win big

Wet-process promise

Turnaround for 3D printing

Dialogue: Rüdiger Fox on PFAS



THE INTERNATIONAL MAGAZINE FOR PERFORMANCE & SPORTS MATERIALS

Contents



Front cover:

The Cloudmonster shoe from Zurich-based athletic footwear brand On. This is one of the shoes that featured prominently in the latest ISPO Award in 2022, when the competition had a dedicated footwear category for the first time.

IMAGE: ON

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- 02 Global news
- 04 People
- 06 Industry & Innovation
- 08 Backtrack

10 Waving, not drowning

Finishing and dyeing have been the parts of textile production that have affected the industry's environmental credentials the most. Ultrasound waves and new possibilities in digital printing could change that.



10

14



14 Printable performance

Changes in the way 3D printers work are making it possible to use the technology to apply performance features to textiles on demand and in an efficient way.

18 Rise to the Challenge: Goldwin and Synflux

A desire for innovation and improvement led Japanese sports brand Goldwin to work with AI technology provider Synflux on a series of low-waste apparel projects.

18



22 Newcomers: Gore-Tex ePE

Outdoor gear incorporating a non-fluorinated membrane from Gore-Tex began to hit the market at the end of last year. Here, we examine what went into making the new material.

26



26 Footwear Technology: Among the prizes

A changed format for the ISPO Award has helped outdoor and athletic shoe brands win the credit they deserve; footwear is now in a category of its own.

30 Sustainability: Garment reuse is a must

Specialist recyclers have calculated that making, buying and wearing a new garment has an environmental impact that is 70 times higher than preparing a pre-worn piece for reuse.

34 Hard to change the game

A few months after its high-profile launch, industry commentators are questioning the claim that the Nike Forward textile material is a genuine game-changer.



34

38 Dialogue: Dr Rüdiger Fox, Sympatex

The chief executive of membrane materials developer Sympatex explains here why he is 100% confident that PFAS chemicals will be banned in Europe within 18 months.



38



30

Advertisers Index

American Events	29
DuPont Susterra	05
Kornit Digital	21
Ortholite	BC
Performance Days	13
Polartec	33
Re:Down	25
Sportstextiles	09

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Global news

Netherlands Amsterdam-based textile innovation brand Byborre has announced new funding of €16.9 million. This is follow-up investment from the €3.2 million it raised in 2020. Byborre said it would use the investment to accelerate international growth in key markets such as the US, Nordic countries and Italy, to expand its network of industry partners and to develop further ideas such as its Byborre Create design tool and its Byborre Textiles materials resource.

UK Athletic footwear and apparel retail group JD Sports has said it is putting plans in place to double its revenues, currently around £8.5 billion per annum, in the course of the next five years. The company said it would also invest between £500 million and £600 million in capital expenditure each year, with 50% or 60% of that investment going into store expansion in "under-represented markets". This will mean opening between 250 and 350 new stores each year.

Germany Sports group adidas has launched its first new sub-brand to come to market in 50 years. Named adidas Sportswear, the new product will use "the latest performance technology" to add another layer of "comfort-first" assurance to everyday wardrobes, said its senior designer, Jasmin Bynoe, who also described how simple cuts, minimal design details and intentional colourways had been selected to make the collection something of a "blank canvas".

Finland Helsinki-based regulatory body the European Chemicals Agency (ECHA) has published details of restrictions to the manufacture, sale and use of more than 10,000 per- and polyfluoroalkyl substances (PFAS) proposed by Danish, German, Swedish, Dutch and Norwegian authorities in January. Together, the authorities estimate that an additional 4.4 million tonnes of PFAS could accumulate in the environment over the next three decades.

Austria Machinery manufacturer Svegea has placed a fully automated EC300-S collarete cutter and FA350 roll-slitting machine in the hands of workers at Austrian sportswear brand Löffler's knitwear factory in Ried im Innkreis. Löffler, which celebrates its fiftieth anniversary this year and still makes most of its fabrics at the Ried site, is today best known for its cycling, Nordic combined, running, ski touring and Alpine sports gear.

Italy High-end outdoor footwear brand Aku has reported revenues for 2022 of €29.2 million, an increase of 28.6% year on year. The Montebelluna-based company said it had achieved 14% growth in exports to European countries and 99% growth in shipments of its shoes and boots to Asia. Overall, it brought in 82% of revenues from exports. It now has four production plants, with two facilities in Serbia and one in Romania complementing the factory at its headquarters in Veneto in northern Italy.

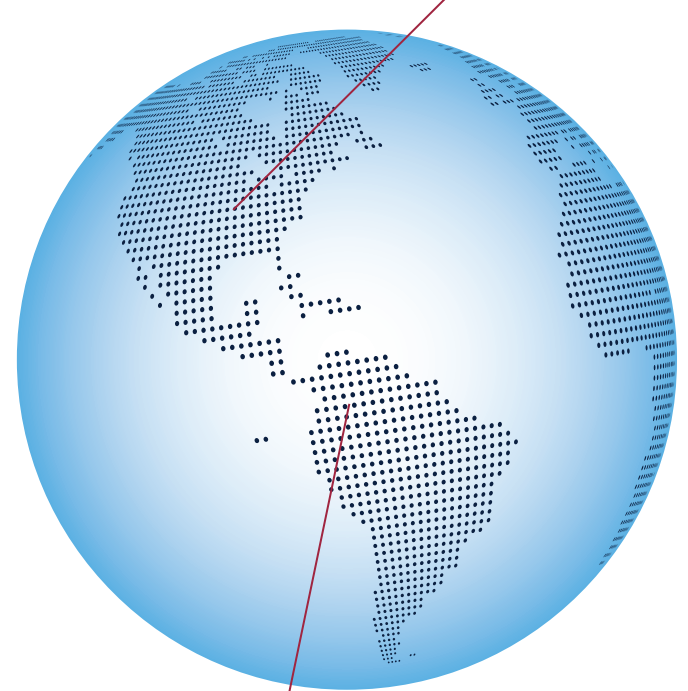
Benin Benin achieved a record cotton crop in 2021, with more than 730,000 tonnes of fibre, largest volume of any African country. Most of the fibre, went for processing in Bangladesh, earn between \$400 million and \$500 million per year for the country. But the government has said it can create around 160,000 jobs and boost its earnings from cotton to a figure of more than \$11.5 billion per year by processing it on home soil.

Uzbekistan Cotton sustainability programme Better Cotton has launched in Uzbekistan, following five years of on-the-ground piloting. The most recent data on the 2021 cotton harvest in Uzbekistan from the International Labour Organisation and non-profit groups has confirmed that state-imposed child and forced labour in the form of cotton-picking is now entirely absent from the country's newly privatised cotton sector.

South Korea Sports group Descente has unveiled its Energize Super V2 running shoe after 6,000 testing hours with 2,183 runners local to its Descente Innovation Complex Studio (DISC) for footwear in Busan. DISC's Korean facilities are spread over three floors and 17,082 square metres. It houses separate research, materials and product labs, as well as its own design studio, a futsal court, a 400-metre running track and a sloping track for incline sprinting tests.

Japan On launching its SugarDown Hoody in the Japanese market, outdoor brand Patagonia has identified local fibre and textile developer Toray as the supplier of the 800-fill-power jacket's 100% plant-derived polyester outer shell and lining. Toray joined with US company Virent to secure suitable plant-based raw material for an important part of the PET equation: terephthalic acid.

US Montana-based outdoor brand Forloh has unveiled a new parka as part of its Expedition Series. It said the garment has down with a fill power above 800 and uses an entirely US-based supply chain and US-made materials. It comes with a lifetime warranty. Forloh worked with performance down fill supplier Downlite to develop what the brand has referred to as "a major breakthrough in down technology".



Pakistan Apparel retail groups Bestseller, H&M, PVH Corp, Inditex, Otto Group and C&A have agreed to play a lead role in a new commitment to workplace safety for textile factory employees in Pakistan. These European companies will form the steering committee for the International Accord for Health and Safety in the Textile and Garment Industry. In all, 190 global brands and retailers and two global union federations have signed the accord.

Cambodia The authorities in the country have given the green light for five new textile and garment factories. Four of the new facilities will be in the Kampong Speu province in the south-west of the Asian country; the fifth will be in the neighbouring province of Kandal. Four of the factories will be owned by Chinese companies. The authorities have said this continued investment in its textiles sector is a reflection of the country's stability and its large pool of affordable labour.

Colombia Italian textile machinery manufacturers travelled in good numbers to Bogotá in January for the Colombiatex 2023 exhibition. Export promotion agency ICE worked with Italy's embassy in the Colombian capital and with industry body ACIMIT to take 19 machinery manufacturers to the event, setting them up in a national Italian pavilion. ACIMIT has said that its member companies achieved €12 million worth of exports to Colombia in 2021. The industry organisation has calculated that exports to the South American country in the first half of last year were 67% up on the same period the year before.

Bangladesh Cotton supply chain information resource Cotlook has said that the industry in Bangladesh has faced further frustration over energy prices. The government in Dhaka said that gas prices would increase again at the start of February. Cotlook commented that the cotton and textiles industry reacted to this news with dismay and that the volume of cotton business concluded there in January was limited.

Indonesia A wholly owned subsidiary of Taiwanese shoe manufacturer Yuqi International, which produces outdoor footwear for customers such as Under Armour and Decathlon, has secured fresh funding for the construction of a new Indonesian shoe factory. It will invest more than \$80 million in establishing a new production base in the province of West Java.

People

Under Armour names new CEO

US sports brand Under Armour has appointed **Stephanie Linnartz** president and chief executive in place of its interim leader and chief operating officer, **Colin Browne**.

Ms Linnartz, who will also join the Baltimore-headquartered company's board of directors, is set to officially take up her new post on February 27. She has served as president of hospitality group Marriott International since February 2021 and has been a board member of both North American home improvement retailer Home Depot and the College of the Holy Cross, where she obtained her bachelor's degree, since 2017.

More recently, Ms Linnartz was named to the Washington Business Journal's Power 100 class of 2022 and made Forbes' inaugural CEO Next list in 2021. She is also a member of the socially minded Fortune CEO Initiative for global corporate leaders. Her latest appointment was made following the recommendation of a committee of independent members of Under Armour's board of directors. 🌐



CREDIT: UNDER ARMOUR

Rendle retires

Clothing and footwear group VF Corporation has announced that its chief executive, **Steve Rendle**, retired from his position in December. **Benno Dorer**, an independent director on the group's board, will be interim chief executive. VF said its search for a new, permanent chief executive had already begun.

Mr Rendle said it had been an honour to lead VF for the last five years and he remained "as confident as ever in VF's tremendous potential".

The group, whose brands include The North Face, Timberland and Vans, also made a statement on its outlook for its current financial year, which runs until the end of March.

Having predicted as recently as October 26 that it would achieve growth of 5% or 6% for the full financial year, it has now lowered this predicted figure to 3% or 4%. 🌐

New managing director for Polartec

Specialist developer of performance fabrics Polartec has named **Eric Yung** as its new managing director. He was previously its director of international sales.

Parent company Milliken has decided to group Polartec with its government and defence business units in a new division of the company, which will be led by **Dr Ramesh Kesh**, who has worked at Milliken for almost 30 years.

Milliken said that in promoting Eric Yung to his new role it was "reaffirming and strengthening its commitments to the Polartec brand and partners". Mr Yung will also now become a vice-president of Milliken. 🌐

Technical sales

A former global group director of textiles at Microban, **Bart Kennedy**, has been named technical sales director at Polygiene, the latter company has announced. Mr Kennedy had previously held senior sales, marketing and merchandising roles at Lenzing, Kaltex, Crypton and Invista, where he primarily worked with the Lycra, Coolmax and Thermolite brands between 2007 and 2010. 🌐

Clarification

Last year, we published comments from **Professor Will Dichtel** of Northwestern University in an article entitled 'PFAS have an Achilles' heel'. Professor Dichtel has asked us to make clear that his team's discovery of a method for making PFAS fall apart under mild conditions "in no way justifies their continued use in textiles". The conclusion in the article that this new idea could help manage the ongoing presence of PFAS in clothing was ours alone. It was not our intention to suggest Professor Dichtel was advocating the ongoing use of PFAS in apparel.

Fila role filled

Sports brand Fila has named **Todd Klein** as president of its North American business after **Jennifer Estabrook** retired in December. Mr Klein is an alumnus of both Reebok and adidas, where he was most recently vice-president of advanced concepts marketing. Earlier in his career, he held the position of global sports marketing director at Reebok.

Nine years in the making

Picture Organic Clothing has said its success in being named as a winner in the apparel category of the Outdoor Sports Retail Performance Awards is the result of much hard work. It said it was delighted to have been put in the spotlight by market research firm NPD Group, organiser of the awards, but co-founder **Julien Durant** has told WSA that Picture has been working hard for nine years to make a name for itself in the US.

Product post at Puma

Sports brand Puma has appointed **Maria Valdes** as its new chief product officer. She took up the role in January this year. Originally from Chile, Ms Valdes has worked at Puma for more than 12 years and was previously general manager of its Sportstyle business unit. In her new role, she will continue to be responsible for Sportstyle and will add motorsport, teamsport, running, training, basketball and accessories to her brief.

Back to Hyosung

Technical textiles marketing specialist **Simon Whitmarsh-Knight** has rejoined fibre group Hyosung, becoming the global marketing director of its textiles

Head of outdoor coalition hails great opportunity

It's Great Out There, the coalition that the European Outdoor Group set up in 2017 to encourage people to embrace outdoor lifestyles, began the new year with a new secretary general. Its former policy officer, **Margo de Lange**, became secretary general in January.

In her first public comments since taking the role, Ms de Lange said her aim was to help It's Great Out There motivate and advocate more effectively, more inclusively and more widely than ever. She said: "This is a wonderful opportunity to work with the industry and community representatives and tap into a huge depth of experience and love for nature from all over Europe." 

Major changes at Anta

Sports group Anta announced significant changes to its executive leadership team, effective February 1. The aim behind the shake-up, the company said, is to move its multi-brand and globalisation strategies forward, plus split the dual role of chairman-chief executive, a position currently held by group co-founder **Ding Shizhong**. It also intends to improve management efficiency and talent development.

Mr Ding will retire from his responsibilities as chief executive and remain as chairman. He will be replaced by co-chief executives **Lai Shixian** and **Wu Yonghua**, formerly chief financial officer and chief executive of the group's performance sports division, respectively. Mr Lai is brother-in-law to Mr Ding. 

Sprint finish

Sports brand Puma has added Italian sprinter **Marcell Jacobs** to its roster. Mr Jacobs is the reigning Olympic and European champion in the men's 100 metres event, as well as both World and European champion for the 60 metres indoor sprint. The athlete will now wear Puma's EvoSpeed Tokyo Nitro track and field spikes at events. 

division. This move comes two years after he left his previous role as European marketing director for apparel at the Korea-based group to become managing director of wool insulation specialist HDWool. Before then, he spent nine years at Invista.

Machine moves

Textile machinery group Rieter has announced the departure of chief executive, **Norbert Klapper**, after nine years in the post. His replacement is **Thomas Oetterli**, who joins the specialist developer of systems for manufacturing yarn from staple fibres, following more than 15 years at industrial group Schindler.

In shape

Swimwear brand Skims, which launched as a shapewear line in 2019, has appointed **Robert Norton** to its executive leadership team. Mr Norton most recently served as Milan-based luxury outerwear company Moncler's Americas president. Prior to that, he was in charge of overseeing the Americas business of Roberto Cavalli. He worked at Ralph Lauren for close to 15 years before then. 



Made to stay on the move

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Industry & Innovation



Fleece fragment progress

Performance materials developer Polartec has announced a new type of fleece that sheds fewer fibre fragments. Shed Less Fleece is the result of a process that combines yarn construction, knitting, chemistry, and manufacturing techniques to reduce fragment shedding during washing by an average of 85%.

During the process, the lofted fibres that give fleece its soft hand are engineered to give them the ability to resist breaking and rubbing off during home laundering, while maintaining the material's softness and lightweight, breathable and warmth attributes.

The first fabric to which the company has applied this technology is the 200 Series fleece, an up-to-date version of the original PolarFleece, launched in 1981, and, in 1993, the first performance fleece knit from yarn made from recycled plastic bottles. 🌐

Extended use for 40 million garments

Fashion group H&M has created a new, 50-50 joint-venture with materials recycling group Remondis to collect, sort and sell used and unwanted garments and textiles. They have called the new Stockholm-based operation Looper Textile Co.

It will start its operation in Europe and says it is aiming to extend the use of approximately 40 million garments there before the end of this year. It says it will innovate textile collection and sorting, with new collection schemes and automated sorting technologies such as near-infrared, as well as developing a network of partners in reuse and recycling. 🌐

Alpine heritage

Twelve partner organisations from six different Alpine countries launched a new European Commission-funded project called AlpTextyles in January.

In the build-up to the event, the project partners said that the Alpine regions of Europe have a "rich textile heritage, brimming with specific aesthetics and know-how". They insisted that these traditions are based on the values of circularity and local resources.

They added: "As consumers grow increasingly critical of globalised value chains and turn to more sustainable lifestyles, the Alpine heritage could contribute to a reterritorialisation of textile value chains."

Traditions have been disrupted by global sourcing and offshore production, they said, and sourcing locally again will boost natural local resources. AlpTextyles will also aim to "project an attractive image" of textile practices in these regions to help justify the higher price of Alpine products.

Part of the project's work will be to gather "precious textile ecosystems to create a common ground of expertise in research and innovation, foster regional development and job creation, and safeguard cultural heritage and circularity". 🌐

Protein boost

Synthetic silk biopolymer developer AMSilk has joined hands with Brain Biotech, a manufacturer of bioactives and speciality enzymes also based in Germany, in a bid to optimise and expand its protein technology platform to better meet the demands of performance textile fibres.

Move approved

Specialty chemicals provider to the global textile industry Archroma has secured all the necessary regulatory approvals for its acquisition of Huntsman Textile Effects from Huntsman Corporation. Both parties now expect the transaction, which they announced in August, to close on February 28.

Fully booked

The European Committee of Textile Machinery Manufacturers (CEMATEx) has announced that the 220,000 square-metres of space available for its ITMA 2023 exhibition is already fully booked. ITMA 2023 takes place in Milan from June 8-14. CEMATEx has described it as "a highly anticipated showcase of trendsetting textile and garment technologies".

Footwear first

Sports shoes from Salomon will be first to market with a midsole made by BASF with Elastollan thermoplastic polyurethane using supercritical fluid (SCF) foaming technology, the materials developer has revealed. The use of SCF for the midsole makes post-consumer recycling a possibility as no crosslinking or chemical blowing agents are used in the foaming process.

Organic cotton label looms

Testing, certification and research institution Hohenstein will launch a new organic cotton label during this year. Two 'pilot' customers have already been successfully certified by Hohenstein: Indian textile supplier Milan Group and Turkish cotton producer Akasya. Hohenstein said the new label would offer assurance that all requirements for certifying cotton as organic have been met. It will also ensure that the cotton contains less than 10% genetically modified material and complies with pesticide limits. 🌐

Textile industry reacts to earthquake disaster

Textile industry organisations were quick to express sorrow and concern for victims after violent earthquakes hit Turkey and Syria. The death toll had reached some 44 thousand by mid-february.

An earthquake measuring at least 7.8 on the Richter scale hit south-eastern Turkey and north-western Syria in the early hours of February 6, with the epicentre close to the city of Gaziantep. There has been many aftershocks, including one measuring at 7.5 with its epicentre in the neighbouring province of Kahramanmaraş.

Swiss textile machinery manufacturer Oerlikon said the region around Gaziantep is an important area for the textile industry and that it had many friends, customers and partners there. It extended its condolences to the families of the victims and wished a swift recovery to all those affected.

Global head of textiles for Freudenberg subsidiary Klüber Lubrication, Livia Chen, said she had been to Gaziantep at the end of 2022 for meetings with customers and colleagues. She said she had been impressed by the professionalism and level of technical expertise among the textiles industry contacts she had made there and said she was deeply saddened by the news of the earthquakes.

Italian yarn finishing technology provider Savio Macchine Tessili expressed its condolences, too. It described Kahramanmaraş as the heart of Turkish textile industry. It added: "Where previously only cotton fields could be found, a major textile industry has arisen, specialising in the production of quality yarn and superior fabrics." 

AeoniQ in action

Textile technology developer HeiQ worked with Italian fabric manufacturer Beste to create a capsule collection for the Milano Unica exhibition at the end of January.

Prato-based Beste is specialist developer of fabrics for luxury brands. For this new capsule collection, it used AeoniQ, the high-performance, cellulosic yarn that HeiQ introduced in 2021 as a replacement for polyester and nylon in the textiles supply chain.

Weeks earlier, Hugo Boss launched a first product made from AeoniQ fibre, a polo shirt in its Boss Green range. The garment is made from 87% AeoniQ and 13% polyamide. 

Haelixa traces wool from Australia to Italy

Switzerland-based traceability technology provider Haelixa has announced the completion of a trial project to apply two separate DNA markers to Australian wool, enabling the material to be traced from fibre through finished fabric.

Partnering with the Woolmark Company, funded by woolgrowers in Australia, Haelixa first marked early-stage greasy wool in December 2021 to determine its country of origin, followed by scoured wool in Italy to verify where processing took place. DNA solutions were applied in both instances as a fine spray. The latter marker was embedded at Biellese mill Vitale Barberis Canonico, which has been in business since 1663.

Quantitative polymerase chain reaction (qPCR) tests to detect each specific marker were conducted on samples at various stages of production, Haelixa said, adding that its markers allow greasy wool to be traced up to greige fabric and scoured wool up until finished fabrics.

In a nod to growing market demand for proof of origin and authenticity, co-founder and chief technology officer at the Swiss firm, Gediminas Mikutis, praised the effort to "bring sustainable solutions to global supply chains". 

New funding for waste-to-polyester

A chemical company that is developing technology to recycle CO₂ waste fumes from chemical plants into high value textile products through a circular manufacturing process has raised €22 million in new funding.

The company, Fairbrics, has secured €17 million from the European Union's Horizon 2020 programme and a further €5 million from a group of partners in Spain, Belgium, Finland, Italy, Germany and France.

Paris-based Fairbrics will use the funding to develop a pilot line of its technology that will have the capacity to process 100 kilos of CO₂ emissions per day by 2024. By 2026, it intends to have in place a demo plant with the capacity to process 1 tonne of CO₂ per day. 

Showcase for biomaterials

Fabrica X, the concept store that sustainability acceleration platform The Mills Fabrica runs in Hong Kong, has launched a six-month showcase for innovations in biomaterials in textiles. Relunched in July 2022, Fabrica X combines retail, education, and "experiential discoveries" through different campaigns related to sustainability. Its partners for this new project include New York-based biomaterials consultancy Biofabricate and yarn developer Lenzing.

Temperature change

A new smart vest from US workwear brand Carhartt uses Clim8's technology to circumvent the need for bulky layers by allowing users to monitor and adapt their body temperature to changing conditions in real time. The garment, powered by Lyon-based Clim8's artificial intelligence (AI), enables the wearer to personalise their temperature settings for optimum comfort through pairing the article with a smartphone application.

Repairable zip

Outdoor brand Artilect has become the first to incorporate new fastening technology from YKK into garments. It has put YKK's Revived zipper into its Formation 3L Shell jacket and High AF down jacket. The significance of this, the brand said, is that the new zips are repairable. The zipper slider can be detached and reattached in the field by the wearer.

Warmth and strength

Südwolle Group has presented a new collaboration project with the Woolmark Company, Milan-based innovation hub D-house, and yarn producer Expotex. Products to have emerged from the project so far include a garment that the partners have called the Thermoform Sweater. This sweater combines the warmth and comfort of wool with the strength and durability of Expotex's Grilon polyamide yarn in an 87%-13% mix.

Name change

The European Confederation of Flax and Hemp (CELC) has changed its name to the Alliance for European Flax-Linen & Hemp. Representing more than 10,000 companies in 16 European countries, the Paris-based organisation will continue its efforts to make hemp and linen the world's "preferred sustainable fibres". 

Backtrack

16.02.2023

Further funding for Checkerspot

15.02.2023

Adidas kicks off global trainer design tournament

Polygiene's China distribution is flourishing

A new OrganoClick has started to emerge, CEO claims

14.02.2023

Three more clothing brands join Canopy viscose initiative

13.02.2023

Government figures show economic importance of cotton

Skateboarding enshrined in USPS forever stamps

10.02.2023

Lower-impact fibres dominate for Royal Robbins

Triathlon partnership extension for ASICS

Adidas homes in on 'next-generation behaviours'

09.02.2023

New standards on the way for pole vaulting

Chemical company makes water-saving pledge

Acquisition gives Lectra a new dimension

Nine-month figures hold steady for Under Armour

08.02.2023

Latest operating profits are new record for Goldwin

A buyer emerges for Keds

07.02.2023

Tencel team celebrates 'first' carbon-zero lyocell sale

Indera Mills no longer family-owned

06.02.2023

Karachi container logjams could soon begin to ease

Polygiene recruits new technical sales director

03.02.2023

Data-backed textile solutions eligible for new funds

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.

02.02.2023

Appetite for PrimaLoft's ThermoPlume is unabating

01.02.2023

Adidas teases first new label in 50 years

Bio-responsive material powers energy-return in UA shoes

31.01.2023

Recognition for down development at Outdoor Retailer

Plastic-free materials tool launches for designers

Accelerating Circularity shares textile recycler directory

30.01.2023

Special shirt generates record sales

Cyber incident at JD Sports

VF finds new Tokyo design base has Harajuku style

Snow Peak continues Korean 'Green Peak' line

27.01.2023

3M gears up for PV Paris showcase

26.01.2023

Archroma finds new use for old textiles

25.01.2023

Ralph Lauren commits to cashmere recycling

Japanese ministry forms textile recycling committee

24.01.2023

Registrations open for the 2023 Woolmark Performance Challenge

Reebok's 'revolutionary' tech further refines Nano

Shoe from Garmont is a winner in the Design & Innovation Awards

23.01.2023

Canada Goose moves into rental in the UK

Momentum grows for counting producing countries among sustainability costs

Tributes as Desma distributor retires after 55 years' service

A year of two halves for sporting goods

20.01.2023

CEO says Covestro's products are 'part of the solution'

Year-long textile microfibre upcycling project begins

19.01.2023

Capsule collection will mark Garmont's work with ACBC

Dyes used to isolate recyclable PET textile fibres

Zero Waste Europe identifies 'key' business criteria

18.01.2023

Adidas' debut FIGC jerseys are 100% recycled

Patagonia chooses Nanjing for first Jiangsu store

Welcome for new deforestation regulation from Kelheim Fibres

17.01.2023

Wool and weave-density deliver 'revolutionary' windbreaker for yacht team

Treksta developing 'Korean-style' bobsled shoes

Adidas opens first Home of Sport in Asia-Pacific

16.01.2023

Cautious optimism in cotton industry

Decathlon co-founds Spanish textile waste alliance

Nike's new book anticipates next 50 years of design

STAY AHEAD



Israel-based Sonovia is also working on a system to dye indigo among its plans to develop cleantech solutions for fabric finishing and dyeing.

CREDIT: SONOVIA



Waves of change

The dyeing and finishing of fabrics has a long history of polluting waterways and using undue amounts of fresh water, chemicals and energy. Waterless solutions have been developed over the years, from supercritical carbon dioxide (scCO₂) for dyeing, to plasma for applying additives to a textile substrate. But these technologies, for reasons not only related to cost but also to handling, have not been widely adopted by dyehouses and mills.

Sonovia, based in Israel, and Alchemie, in the UK, believe their innovative finishing technologies can truly change the landscape and help make a 'dinosaur' industry cleaner, safer and more sustainable.

'Dinosaur' is the term that Alan Hudd, CEO and founder of Alchemie, uses to describe the textile industry. "It can take decades to introduce a new technology in this industry," he tells WSA. "It took ten or 15 years before digital printing became widely adopted." He has first-hand knowledge of the industry's resistance to that particular change, having 35 years' experience in digital printing. Alchemie is the result of his quest to optimise digital printing, and he says that he ended up changing the whole system. Four years of research led to the development of a

Technologies including ultrasound waves and digital printing promise to usher in a new generation of cleantech solutions for traditional wet processes.

brand-new technology, patented in 2018, that can dye fabrics or apply finishes in near waterless conditions and with significant savings in energy and chemicals as well.

The Cambridge-based company introduced its first machine, Endeavour, last year. It offers what he says is a "large-area fabric colouration" solution and addresses a blind spot in digital printing. Widely used for high-resolution printing, the technology is considered less appropriate for applying solid colours on large areas. "The result is not homogenous," he says.

Endeavour's process is an evolution of inkjet printing but its printer nozzles, of which the machine has 1,440, do not come into contact with the textile. They are powered by piezoelectric crystals. When a voltage is applied, the piezo crystals change volume and this excitation process releases or "fires" droplets into the fabric. "They

“Dyeing is the worst process in textile manufacturing; our machine offers the apparel industry a clean technology where it is most needed.”

ALAN HUDD, ALCHEMIE

jet 1.2 billion drops per linear metre of fabric,” says Mr Hudd. These make it possible to dye the “whole depth of a textile, delivering the same consistency on both sides and all the way through.” Its kinship with digital printing is that it is an on-demand technology that can be turned on or off at will. This makes it possible to dye lengths of fabrics in a given colour from 100 to 2,000 metres, he says.

Piezo and infrared technologies

When printing on a polyester ground, an infrared process fixes the disperse dyes. The fabric loops through the unit to expose both sides to heat and emerges dry, requiring neither rinsing nor washing. “Infrared radiation is an efficient way of applying heat, it only heats the surface of the fabric. This system modernises an old process,” Alan Hudd says. When ‘dyeing’ cotton, the fabric goes through a steamer to fix the reactive dyes, a softener is added, and a rinsing stage is needed to remove the unreacted dyestuff.

The technology promises to radically reduce the impacts of dyeing. Contaminated wastewater is said to be reduced by 95%, energy usage by 85%, and dyes by 30%. “Dyeing is the worst process in textile manufacturing; our machine offers the apparel industry a clean technology where it is most needed,” says Mr Hudd. Compared to batch jet dyeing, which can take four hours, the Endeavour applies dyes to fabric in a continuous process, that the company says is three to four times faster. “The linear speed of dyeing is 20 metres per minute, and our machine can do short or long runs; it is very flexible.”

Alchemie is finalising another machine, Novara, which is designed to apply a functional additive to textiles using the same technology, but on a single side of a fabric. It can furthermore apply different chemistries in different zones to create body-mapped functions. “It is a modular, on-demand technology. We can selectively pattern and apply chemicals only where needed, be it water-resistance or breathability,” says Mr Hudd. Alchemie has partnered with Swiss chemicals company HeiQ and can apply all of its finishes using its printing technology. The Novara machine will be officially launched at ITMA in Milan this June.

The company says it had already sold 15 machines by the end of 2022. Taiwanese textile



manufacturer JSRTEX is cited as one buyer. Mr Hudd expects to sell 50 this year and possibly 300 in 2024.

Harnessing the power of sound

As a technology said to accelerate wet processes, ultrasound, or ultrasonic processes, are used to clean textiles, as a pre- or post-treatment finish. High-frequency waves that are inaudible to the human ear are applied to a fabric after weaving to remove oil and dirt. Sonovia has upended this concept by using the same physics to add a function instead of removing contaminants. “For the past 200 years, the textile industry has used mainly one media to transfer chemicals to a textile: water. Ultrasound reduces the amount of water needed and anchors the substances deeper in the fabric,” Sonovia CEO, Igal Zeitun, tells WSA. “We are doing the opposite of traditional ultrasound processing.” The technology developed by the company is an evolution of a patent it purchased from Bar-Ilan University, which led to the creation of its SONOfix technology. The machine it uses is manufactured by Brückner, a German textile machinery maker.

The technology is not technically waterless, as the textile needs to be humid, and ultrasounds travel better through water, says Mr Zeitun. “But it saves a significant amount of water,” he insists. “In certain cases, the use of water and chemicals can be reduced by as much as 80%.” Sonovia has devised a system in which the ultrasounds, in a range of 10s of KHz, act as a propeller to drive the agent into a textile. “It propels an additive at high energy to anchor the agent deep into the fabric and achieve longer durability and higher wash-resistance,” he says.

Sonovia’s immediate focus is in the sportswear, workwear and underwear industries where it seeks to market its anti-odour application. But the company has other plans, including a technology to dye indigo into yarns to make denim fabrics. Its main solution is currently an anti-odour finish based on zinc oxide. It can be applied on any type

Alchemie’s Endeavour technology is a novel dyeing process that reduces water consumption drastically (by 95%) and injects dyes into fabric.

CREDIT: ALCHEMIE

of fabric, natural or synthetic, and their blends. The ultrasounds create a physical bond between the active agent and the fabric. "It is not a chemical bond and no binders are needed," he says. The company claims that it can use half the amount of chemicals compared to traditional wet processing to achieve the same level of efficiency. "There is no leaching, and the finish can resist from 80 to 100 washes, it is virtually permanent," he says. Zinc oxide has other properties: it is said to be antibacterial, antiviral, and photocatalytic. "It has the ability to destroy large odour molecules, which means it can also reduce and absorb odours that are not created by bacteria," he says. In the future, the process will also be developed to apply a water-repellent finish.

Two prototypes of the SONOfix machine have been made: one is at Bruckner, the machine's manufacturer, and the other at Delta Galil, a sports and underwear manufacturer based in Israel. "We began testing and optimising the process of applying our anti-odour finish at Delta Galil last July," says Mr Zeitun. Early this year, the apparel manufacturer began testing four of its own fabrics. "We are now in true demo phase," he says. The goal is to achieve a resistance of 100 wash cycles, which can be considered to deliver permanent anti-odour properties. The industrial partners are also seeking to speed up the process from a current rate of 15 metres per minute to an objective of 40 metres per minute. "We believe this covers 80% of finishing worldwide," he says.

For indigo, different frequencies of sound waves will be used, and Sonovia says that, here too, it will lead to significant reductions in water use, by 70% to 80%, and a reduction in cost of between 30% and 40%. "Our process makes it possible to bring down dyeing baths from 10 to just two, cancel some of the preparation processes, and remove the need for water post-treatment. It is a true disruption in the way denim is manufactured," says Mr Zeitun. In this case, the company does not plan to improve the durability of the dyed yarn, as this is not what the industry needs or wants. The ultrasounds, in altered frequencies, do not anchor the dye particles too deeply or too hard in the warp yarns, as the denim market wants its yarns to have a white core, considered more authentic. Sonovia is working with Italian premium denim manufacturer Pure Denim, which will be testing the process this year, and a new machine could be ready for commercialisation in 2024.

The SONOfix machine is said to be easy to integrate into existing production lines. The business model the company is pursuing is to sell the machine, install it, and then provide its proprietary formulations, or consumables. Mr Zeitun concedes that the textile industry is a challenging sector with regards to cost, performance and sustainability. "It will accept no compromise; it is a very demanding industry," he says. Sonovia plans on developing other finishing and dyeing solutions in the future to cover all the main textile industry applications. "We have seven



PhDs in chemistry, physics and chemical engineering in our multidisciplinary team, not only ultrasound specialists," he says of the company's 40 employees.

At Alchemie, Alan Hudd plans to sell the machine, not the chemicals: "We don't want to create any barrier to adoption. Our machine will work with off-the-shelf dyestuffs and we intend to work with existing dyestuffs suppliers." He adds that its process removes the need for some additives, and this is part of the company's value proposition. This company is also working on an application for indigo dyeing.

Alchemie's technology uses higher frequencies than ultrasound to create a resonance in the nozzle that results in the ejection of a droplet of dye or additive. Mr Hudd says that ultrasound typically uses frequencies in the range of 30,000 per second to disrupt the structure of fabric and remove contamination; his company's technology operates at a level of 180,000 per second.

The machines made by Alchemie are more expensive than jet exhaust dyeing devices, but Mr Hudd says a single Endeavour can replace three or four jet exhaust machines, and represents a similar investment. "When you add in the savings in energy, wastewater, labour and materials, a dyehouse can achieve higher profits," he says, adding that its machines deliver a return on investment in 18 months as opposed to several years. "Our mission is to change the image of the textile industry from the status of 'worst offender' to a clean tech industry. Our technology can help reshore production, and reduce shipment and logistics related to textile manufacturing."

From its conventional use as an accelerator for various chemical and physical reactions for cleaning, emulsion or extraction, ultrasound and high frequency technologies are now, as we have seen, expanding to new fields. The next step is that a 'dinosaur' industry ride this new wave that can lead to significant savings in water, chemicals and energy. 🌐

A selection of fabrics dyed using Alchemie's 'large-area fabric colouration' solution.
CREDIT: ALCHEMIE



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A new generation of 3D printers can apply decoration or performance features directly onto fabric. Components made using additive manufacturing are also finding novel functional uses in shoes and backpacks. Together they may signal a new dawn for a technology that has yet to find a viable industrial use case, otherwise known as 'killer app', in consumer goods.

3D printing takes a new turn

Additive manufacturing found its first uses in prototyping. The development of desktop 3D printers then fuelled a boom which in a short time seemed to go bust. In fashion, the technology inspired a number of avant-garde designers, who include Iris Van Herpen and Julia Koerner. With the introduction of printers that can apply three dimensional shapes and details directly onto a textile base, a whole new field of ornamental or functional features is now possible.

Stratasys' new J850 TechStyle printer, introduced last year, breaks away from the mould that made first-generation 3D-printed and plastic-structured dresses mostly unwearable. No small feat to develop, the company based in Eden Prairie, Minnesota, and Rehovot, Israel, dedicated nearly eight years to making it work. Its uptake has been much faster and it is now being used to make elements for tens of thousands of products, Joana De Medina, Stratasys fashion account manager for France, tells WSA.

The shift from making a standalone 3D-printed element to applying a plastic polymer directly onto fabric posed a number of engineering challenges to the company's R&D teams. The first of these was finding a method of fixing the resin on different types of textiles, whether flat and smooth or with open mesh structures. This stage of research led to the creation of a specific process to make the first layer of resin penetrate the textile to form a structural, mechanical bond that allows the three-dimensional forms to adhere to an item of clothing and withstand washing.

Stratasys' TechStyle device 'prints' a photosensitive acrylic resin that is polymerised by light using two ultraviolet (UV) curing lamps that surround the printer head. This is different from fused filament fabrication, which deposits a polymer through a heated printer extruder head. "With our technology, there is no need to wait for a fabric to cool after printing," says Ms De Medina. The printer deposits the resin in layers measuring



27 microns, each one is cured, or solidified, before the printer head deposits another layer and gradually builds up a shape, as in any additive manufacturing process. Stratasys has developed two types of resins, a flexible and a rigid one, that can be blended to obtain different effects.

Like any digital printer, the device is equipped with cartridges that include the traditional four CMYK colours, an opaque white, a clear resin, and a cartridge containing the first fixing layer. Combinations of these are said to be able to make 600,000 different shades. "The material cabinet holds two sets of eight cartridges. This makes it possible to swap empty cartridges without interrupting printing and speeds up productivity," says Ms De Medina.

The substrate, which can be a textile or leather, undergoes a pre-treatment process before printing and cannot have any hydrophobic or water repellent finish. Its size cannot exceed 2m x 2m and its thickness needs to be in a range of 0.1 to 3mm. The panel is placed on a tray, and held flat by a



The TechStyle printer developed by Stratasys can print three-dimensional structures on any textile substrate.

CREDIT: STRATASYS



magnetic system. Each printer has two trays, so an operator can prepare one tray while the other is being printed, another feature designed to speed up processing. When printing smaller panels, such as shoe uppers, they are placed on a support material, adding a manual operation to the process.

The main design constraint is the size of the printed pattern which is limited to 36 cm x 46 cm (14 inch x 18 inches). "The TechStyle printer was made using an existing chassis," says Ms De Medina, suggesting that if a market for larger 3D-printed surfaces is identified, the company could develop a larger model.

The design stage is fully digital, using software to create the pattern and estimate production times. In addition to the size of the tray and the printing surface, another design constraint is the

compatibility between the 3D-printed shape and the structure of the substrate. Long spiky shapes will not hold if their base is too small, but she says designers can play with height and base to overcome these challenges.

Not only decors

Ms De Medina insists that the TechStyle 3D-printer is not only designed to print a decor or update beading but it can also add a function. Among these, she says that thermal or pressure sensors have been printed by designers. "We are just beginning to explore the possibilities of the technology and we are open to collaborations," she says.

When digital printing specialist Kornit, a company also headquartered in Israel, acquired

German activewear brand adidas launched its first Futurecraft shoes with 3D printed soles by Carbon in 2015. Its newest 4DFWD running shoes have a bowtie-shaped lattice midsole that is said to convert vertical pressure into a horizontal force, providing runners with a smooth forward transition.

CREDIT: ADIDAS



Stratasys' new J850 TechStyle was officially presented at *Première Vision Paris* in July 2022. The direct-to-textile 3D printer has since been used to make tens of thousands of products, the company claims.

CREDIT: FRANÇOIS DURAND

Massachusetts-based Voxel8 in 2021, it made its first steps into direct-to-textile 3D printing. "The technology we acquired with Voxel8 includes synthetic elastomers that can be produced with different firmness, for a range of decorative and functional purposes such as grip, bracing, cushioning, impact resistance and waterproofing. These materials can be applied to a range of substrates, both natural and synthetic," Robert Zoch, global content manager for Kornit Digital, tells WSA.

In addition to Voxel8's technology, Kornit's XDi printers can make what it calls "threadless embroidery" and 'flat' or micro three-dimensional decors in an array of materials including silicone, metallic, reflective or high-density substances. The company is planning to launch a new 3D printer, the Kornit Apollo, that can apply its XDi technology to ready-made garments. "It will be the first system for sustainable, single-step, on-demand digital direct-to-garment production with integrated curing capable of delivering 400 retail-ready applications per hour," he says. Much like the company's legacy digital textile printers, the 3D printers allow on-demand and waste-free production. Their versatility makes it possible to "localise production to mitigate supply chain risk and fulfil orders faster, in any quantity," says Mr Zoch.

Confident in the potential of its digital and 3D printers, Kornit hopes to achieve revenues of \$1 billion by 2026. Its sales in 2021 were \$322

million and it expects to close 2022 with revenues of \$281 million. Stratasys does not operate in the same market, but for comparison's sake, its sales in 2021 amounted to \$607.2 million, up 16.6% compared with 2020. The company derives two-thirds of its revenues from sales of products and consumables and roughly a third from services (including spare parts, maintenance).

Support & cushioning

California-based Carbon 3D is another maker of 3D printers that has gained a foothold, literally, in the sports industry as the supplier of the machines that make the 3D printed soles of adidas' Futurecraft 4DFWD shoes. Its Digital Light Synthesis technology polymerises a resin using light, as does Stratasys's TechStyle printer. The sophisticated lattice-like structures it can manufacture have found many applications in sports equipment, including bike saddles and helmets. Two German companies, Zellerfeld, based in Hamburg, and Oechsler, based in Ansbach, near Nuremberg, have acquired Carbon printers and have worked with designers and brands from Heron Preston to Dior and from Rains to Botter, to develop outlandish footwear.

Carbon's printers have also caught the eye of backpack makers, who have tested its potential for one-off trials as well as commercial product ranges. The cushioning and energy-returning properties of the three-dimensional back modules made by Carbon's 3D printers is what struck Magdalen Hamel when she first discovered the components that now equip Jack Wolfskin's Aerorise range of packs. The category manager for equipment at the German brand describes it as an 'aha' moment. "The initial aha moment was not visual, but tactile," she says. "When I touched the module, it squeezed, I could feel the energy absorbed and returned. It felt very cool," she tells WSA.

She immediately identified the benefits it could provide for hikers: "It felt like it could be a good solution to offer a user a supportive, ergonomic fit, provide ventilation and remain very lightweight. It is a potential game-changer for backpacks." After

Digital textile printing specialist Kornit offers several 3D printing technologies, its XDi printers can create textured graphic patterns.

CREDIT: KORNIT





Left: German sportswear brand Jack Wolfskin has equipped its new Aerorise backpacks with smart 3D-printed pads.

CREDIT: JACK WOLFSKIN



Right: In its investigation into monomaterial designs, German sportswear brand Vaude developed an experimental backpack that has 3D printed elements.

CREDIT: VAUDE

a soft launch last fall, the brand is rolling out three Aerorise backpacks for summer 2023 in three sizes (20, 30 and 40 litres), and each has four 3D printed pads developed in a collaboration involving Jack Wolfskin, Oechsler and Carbon 3D.

The pads are made from an elastomeric polyurethane that can have varying levels of firmness, for structure, or softness, for comfort. "This is a key difference compared to conventional backpacks where foams of different densities need to be combined with an air mesh to achieve the necessary support and breathability," she says. The highly breathable structure of the pads is said to reduce back temperatures by up to 5°C. "When the load and the dynamics of body movement come together, the pads create a pump effect. There is an intake of air and then it is pushed out. These are the extraordinary properties of the concept and material," says Ms Hamel.

On-demand & zero waste

3D printing is an on-demand and no-waste process that makes it possible to streamline manufacturing and limit the unnecessary impacts of unused or excess material. But it takes eight hours to print a pad. "It is expensive, and it is worth every penny," she says. "A user immediately feels the difference. That is our key message, and our key feedback. Testers have told us that 'the load flies off the back' and 'you forget you are wearing a backpack'."

Earlier last year, Vaude showcased a backpack with 3D-printed components, the Novum 3D, also made by Oechsler on Carbon 3D printers. This prototype was part of the German sportswear brand's investigation into monomaterial designs, Benedikt Tröster, company spokesperson tells WSA. The pads, pack sac and straps were made

from a 100% thermoplastic (TPU) material and the non-TPU components can easily be removed because of a fully welded, instead of sewn, construction, he adds.

In 2022, US-based pack maker Osprey introduced a similar concept with its UNLTD Airscape and Antigravity packs. They are outfitted with 3D-printed pads, also made on Carbon printers, assembled on a ripstop shell fabric made from a high-tenacity UHMWPE fibre, similar to Dyneema. The lumbar pads feature three levels of cushioning, from firm to soft. The range initially programmed for a commercial launch in the fall of 2022 was delayed to this spring.

A sustainable 4.0 technology

The makers of 3D printers readily put forward the sustainable characteristics of their machines that produce sophisticated structures on demand and with little-to-no waste. Last year, Carbon introduced a new partially biobased resin, EPU44, which is 40% derived from plants and offers the same performance properties, it states. Adidas is already using this new greener polymer to make sneaker midsoles. Stratasy points out that its resin is not a thermoplastic and can therefore be recycled. Kornit adds to these features the fact that you print only what you want to print, which makes it possible to relocate production closer to consumer markets. This is a point that Jack Wolfskin also appreciates, since its 3D printing partner is also based in Germany.

A bona fide Industry 4.0 technology delivering custom aesthetics or properties, 3D printing is returning to the forefront as a new manufacturing technique for apparel and accessories. Its ability to combine form and function in new ways may signal a new phase in the evolution of design.

Algorithmic Couture's deep roots in traditionally flat-cut kimono patterns adds yet another "invisible" layer to the two companies' ongoing partnership
ALL CREDITS: GOLDWIN



Healthier competition

Bound up with multiple culturally specific connotations, any literal translation of the Japanese concept of *monozukuri* presents a challenge. For the directors of Tokyo-listed sporting goods manufacturer Goldwin, chairman Akio Nishida and president Takao Watanabe, however, the idea is more of a state of mind, driving the company forward in pursuit of new levels of innovation and continual improvement. It permeates the design, functionality and aesthetics of every Goldwin-made product, Mr Watanabe says, and serves as a core guiding principle, meant to focus stakeholders' attention on what it calls the "true value in the invisible". The *monozukuri* spirit is, thus, understood to inspire an attitude of care and sensitivity towards otherwise unseen production details and techniques.

This philosophy also ties in neatly with a key component of the Goldwin group's strategic vision, which is to support the natural environment "through unbound[ed] imagination" that leads to pioneering breakthroughs for the betterment of the world and its ecosystems. The business became an official partner of National Parks Japan in October 2020, for instance, after agreeing a deal with the country's environment



RISE TO THE CHALLENGE

Outdoor sports group Goldwin has been running its own race for over 70 years. It is now working closely with an array of partners, including AI technology provider Synflux, to keep pace with new, low-waste technologies and stay ahead of the sustainability curve.

ministry. Part of this role involves a commitment to promoting the use, enjoyment and protection of 34 national parks by way of co-branded communications and limited-edition 'sustainable' lines produced alongside outdoor performance labels like The North Face (TNF) and Helly Hansen, the local licences for which Goldwin has held since 1978 and 1983, respectively. It later acquired the Japanese trademark rights for TNF in 1994, followed by Helly Hansen in 2017. More recently, the company launched its multi-brand resale initiative Green Baton last July. This take-back project includes repair and refurbishment of used

TNF or Helly Hansen articles, beginning with childrenswear, in exchange for store coupons. Where donations are found to be in irreparably poor condition, Goldwin will endeavour to recover as much reusable material as possible for upcycling. The resulting products will be resold with the Green Baton logo.

Running well

Goldwin is primarily a performance wear manufacturer. Founded by former textile mill employee Tosaku Nishida in 1950, the group started life as a producer of knitted fabrics out of a 130-square-metre factory in Oyabe, Toyama prefecture, some 380km west of Tokyo before quickly moving to concentrate its efforts on sportswear by 1952. Mr Nishida had rather astutely predicted that customer demand would blossom post-war. Own-brand athletic gear came next in 1958 and, in a direct nod to Olympic “gold winners” and its owner’s ambitions, the enterprise previously known as Tsuzawa Knit Fabric officially became Goldwin in 1963. The outfit would indeed go on to clothe 80% of Japanese gold medallists at the 1964 Summer Olympics in Tokyo, but not before Mr Nishida had spent a month travelling around Europe ahead of the Innsbruck Winter Olympics earlier that same year to dissect the technologies of competing textile firms in Italy, Germany, France, Switzerland, Norway, Denmark and the UK. Although he passed away in 2012, Goldwin has shown itself capable of continuing its founder’s legacy by continuing to push forward into new territories ripe for innovation.

Aside from TNF and Helly Hansen, the group’s domestic business comprises sports companies such as Ellesse, Danskin, Icebreaker, Speedo, Neutralworks, Woolrich, Macpac, Canterbury, And Per Se, Maxifresh Plus (MXP) and Fischer at present, not to mention Goldwin Motorcycle and high-end flagship ski and outdoor brand Goldwin. It does not disclose individual financial data, but TNF is widely considered to be a top seller. According to a summary of results for the nine months ended December 31, 2022, released by Goldwin in early February, net sales across the board rose by 17.6% year on year to roughly \$660 million or ¥86.7 billion, whereas total operating profits reached just under \$140 million (¥18.3 billion), representing an increase of 29.1% versus the year previous and a new record for the group. The firm subsequently raised its full-year net sales forecast to approximately \$865 million (¥113.5 billion), an adjustment of 7.2%. Local media reports singled out stronger than expected sell-through of higher priced cold-weather apparel, mainly TNF down jackets and fleeces, as a major contributor to this growth. The deliberately niche TNF Purple Label, meanwhile, a joint venture with Tokyo-based functional fashion brand Nanamica, is thought to make up no more than 5% of TNF Japan revenues. (Nanamica is the brainchild of long-time Goldwin creative collaborator Eiichiro Homma, who became the label’s founding designer in 2003.)

“Synflux and Goldwin used software to minimise the gaps between nesting seams, inspired by rectangular-shaped Japanese kimono patterns.”

The red thread that harmonises the company’s various brands and sub-brands today could be said to run against the grain of profit over improvement. Mr Watanabe told reporters last year that Goldwin’s targets for 2030 include taking the proportion of “environmentally friendly” materials present in its ranges from 28% to 90%, in addition to reducing the amount of textile waste it generates to zero. Already, the firm has made real strides, at least in the latter area. Applying a proprietary artificial intelligence (AI) system called Algorithmic Couture from Keio University spin-off Synflux to both a TNF softshell jacket pattern and a matching fleece sweater-and-joggers set from Neutralworks, each offered in two colourways, has so far led to as much as two-thirds less cutting waste than would typically be produced using standard sewing patterns, the partners estimate. Synflux was officially founded after its algorithmic design approach was selected by H&M Foundation as its ‘early bird’ winner of the 2019 Global Change Award innovation challenge.

Illustrating Goldwin’s own faith in Synflux technologies, its decade-long \$23 million (¥3 billion) Goldwin Play Earth Fund, established together with corporate venture capital arm Goldwin Venture Partners only last year, participated in the start-up’s latest financing round back in December, which raised \$1.6 million (¥210 million) in all. The goal of the fund is to accelerate sustainably minded solutions for the activewear market. It is jointly managed by Ignition Point Japan.

The jacket developed for TNF Japan as part of the Syn-Grid project retains the fit and silhouette of the brand’s original pattern, only this time with a fabric waste rate as low as 5%.



Leaning out

The first fruits to come from the group's tie-up with Synflux, promoted under the project name Syn-Grid, landed in TNF's The North Face Lab and The North Face+ stores, respectively located in Tokyo's Shibuya ward and in the Kita ward of Osaka city, at the start of last November. The jacket features Gore-Tex's 20-denier, three-layer micro grid backer technology, which allows an expanded polytetrafluoroethylene (ePTFE) membrane to bond with 100% nylon fabric. Neutralworks' leisurewear set, on the other hand, is made from bonded sherpa fleece, 70% of which is recycled polyester. The rest of the fabric is composed of virgin polyester fibres. Launched the very same day via the latter brand's Ebisu boutique in Shibuya, the sweater and trousers were also made available through the brand's online shop.

Synflux co-founder and design director, Kotaro Sano, tells WSA that these initial retail-ready garments were two years in the making. Mr Sano had met a TNF Japan executive at a talk and the team began collaborating with the specialist Goldwin Tech Lab manufacturing team not long after. Building on Goldwin's own advanced sewing and patternmaking techniques, Algorithmic Couture was able to reduce the cloth waste rate to 5%, he says, without compromising comfort or performance. It did so by using three-dimensional computer-aided design (3D CAD) software to minimise the gaps between nesting seams, the design director explains, inspired by rectangular-shaped Japanese kimono patterns, as opposed to curve pattern-cutting on square fabrics. He suggests the latter can lead to as much as 30% of fabric being wasted during production, as patterns are designed to fit a length of fabric, rather than the curves of the human body.

Algorithmic Couture works by importing partners' current 3D product patterns and then applying machine learning algorithms to reconfigure them geometrically using simulation. Though the tool remaps patterns on a matrix of squares and triangles, no changes are made to the original fit or silhouette. As the technology is based on fabric pattern and marking systems prevalent throughout the fashion industry, it can "easily" fit into existing manufacturing set-ups, Mr Sano states. Working with Goldwin has proven that Synflux AI works well at commercial scale, he adds, as the group typically makes anywhere between 10,000 and 100,000 units of each style. The group's in-house expertise has even helped the start-up hone its algorithms.

Next-level successes

A particularly unexpected outcome of the Syn-Grid development process, its co-founder shares, was the creation of a new set of algorithmic design tools able to "dramatically improve athletic performance". This latest system analyses motion data to automatically generate new clothing patterns made to foster more



comfortable movement by minimising the stress on fabric construction and, therefore, unnecessary performance-limiting strains on the body during exercise. Synflux has observed strong interest in Syn-Grid since its November debut, Mr Sano tells us, especially from younger consumers and eco-conscious investors as well as the work with Goldwin and others on waste-reducing, lower impact production remains ongoing.

Goldwin, a little less forthcoming, perhaps due to the degree to which it privileges 'invisibility' when it comes to product and process refinement, will surely be encouraged by the progress it has already made in the zero-waste design field in advance of its 2030 targets. As indicated by the remarks of a company spokesperson at the time of Syn-Grid's launch last year, the group is only too aware that simply designing in more sustainable fibres, dyestuffs and other materials will certainly not move mountains in the ever-more-important realms of overconsumption and overproduction. Getting to the root of textile waste means digging deeper. 🌱

Invaluable in-house support from Goldwin Tech Lab only enhanced what Synflux's algorithmic design tools could achieve, even helping to advance the technology's capabilities.

Grow your sportswear business with Kornit Digital

With a global install base in the thousands of units, Kornit Digital (NASDAQ:KRNT) is the market leader in sustainable digital on-demand textile printing systems. Major businesses relying on Kornit technology include FLYERALARM, Printful, and Shutterstock, with producers such as TSC Miami, Kitlocker.com, and Image Magic turning to our capabilities for polyester and poly-blend sportswear specifically.

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- Replicate brand, team, and school iconography with precise graphic detail and consistent colour quality, for **winning licensed apparel**.
- **Print only what you sell**, within moments, and deliver never-before-seen designs **encompassing screen, vinyl, embroidery, dye sub, and 3D effects** – all with a single production system!

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"(With Kornit's system), the capability, the quality, and the durability were all top-notch. We were blown away. This sort of single-pass, and its ability to print on polyester, meant it was

ADVERTORIAL

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market-leading. There was no alternative that could do that."

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Kornit Digital
bonding matters



Snow sports gloves have proven popular destinations for the new ePE membrane, incorporated as an insert.

CREDIT: DAKINE

New legacy thinking

Last autumn, an impressive line-up of global sports and outdoor brands brought a promising new technology from WL Gore's fabrics division to market for the very first time. The innovation, made from expanded polyethylene (ePE), was billed as a complementary, more environmentally friendly materials platform for Gore-Tex membranes at its first introduction to the press in 2021. It has now debuted in functional apparel, accessories and footwear designed by major industry players such as Patagonia, Reusch, adidas Terrex, Salomon, Arc'teryx, Dakine, BlackYak, Ziener, K2, Hestra, Zanier, Kolon Sport, Eider and Roeckl. Shoe brands Meindl and Camper will be next to launch styles with the membrane material this spring-summer, Gore's consumer fabrics business leader, Achim Loeffler, tells WSA.

The company has been engaged in this project since 2009. Completely free of perfluorochemicals (PFCs), ePE's addition moves the business further along on its "responsible performance journey", a key aim of which is to phase out what it considers to be PFCs of environmental concern (PFCECs) over the entire lifecycle of its consumer products. Gore identifies highly fluorinated, persistent PFCs that are small enough to be bioavailable, for example in the water supply, as PFCECs. Originally, the plan was to have eliminated PFCECs by this year. Despite ePE's ability to replace several PFCECs in the Gore-Tex range, the team does not now expect to meet its target before 2025. Mr Loeffler attributes the delay to



NEWCOMERS

The first technical outdoor gear to be produced with a non-fluorinated Gore-Tex membrane landed in stores towards the end of 2022. Over a decade in the making, many of the industry's biggest names have recognised this material as a potential game-changer and welcomed it with open arms.

"product development and scaling challenges". (The insolubility and non-biodegradable qualities of expanded polytetrafluoroethylene [ePTFE], the fluoropolymer on which Gore-Tex built its reputation, are among various properties cited as reasons for what Gore calls ePTFE's environmental soundness and safety.)

Warming up

In ePE, Gore's textile technologists have access to a lower mass, yet high-strength material with which to construct membranes of roughly half the average thickness of others in the portfolio. The expansion process gives it microporous characteristics by creating "billions" of tiny holes that allow vapour to pass through. Combining ePE

with polyurethane produces a breathable, windproof and durably waterproof membrane, the company argues, with internal field tests finding ePE apparel laminates, for general outdoor and everyday use, to be both “very breathable” per Hohenstein’s comfort rating system and as durably waterproof as Gore-Tex ePTFE laminates.

Footwear for daily usage proved just as durably waterproof and breathable with an ePE laminate as comparable designs made with ePTFE. Gloves for snow sports, to which ePE is added as an insert, likewise offered the same level of breathability and durable waterproofing with ePE as they would with an ePTFE insert, Mr Loeffler confirms. Company calculations based on Higg Materials Sustainability Index criteria suggest that articles containing a Gore-Tex ePE membrane could have a lower carbon footprint overall, owing to the composite’s high strength-to-weight ratio, which results in a reduced mass, plus the potential for products to have a long useful life, owing to its hard-wearing resistance to the elements.

Winter sports glovemaker Reusch, a Gore-Tex partner of multiple decades, received its first samples of the new fabric technology in 2020. “We have been challenging each other for years,” the brand’s marketing project manager, Ilaria Pellegrini, says of the relationship, which she describes as one of mutual trust and support, particularly in the realm of product development. Reusch found the technology to be “way more flexible and breathable” than other Gore membranes it had tried, Ms Pellegrini notes, resulting in a more comfortable pair of gloves, but the company was also attracted to the material’s improved sustainability credentials, an important value-adding feature that she explains has been especially welcomed by the retailers it works with. The brand launched its first gloves with a Gore-Tex ePE membrane sandwiched between shell and lining seams in the final months of last year.

Sold under the name Discovery Gore-Tex Touch-Tec, the design is primarily targeted at freeriding skiers and snowboarders. The gloves are made from a water-repellent, four-way stretch softshell polyester and goatskin, with a wool blend lining, and incorporate Reusch’s own, patent-pending Heat Capture system, based on a gaiter construction inside each cuff. The team found the membrane to perform best when coupled with already water-repellent fabrics, Ms Pellegrini goes on to say, but they are “very satisfied” with its quality and functionality. So far, customer feedback has been positive. Beginning next autumn-winter, all new Reusch models requiring a Gore-Tex insert will be manufactured with the ePE membrane as standard, representing around 13% of its lines. Over time, the brand will gradually transition existing Gore-Tex glove styles over to ePE too, the company states, and by next winter the number developed with an ePE membrane is expected to reach eight. “Since most of our business depends on our winter collections, featuring a reliable waterproof membrane is



paramount if we want to stay true to our quality promises,” she concludes.

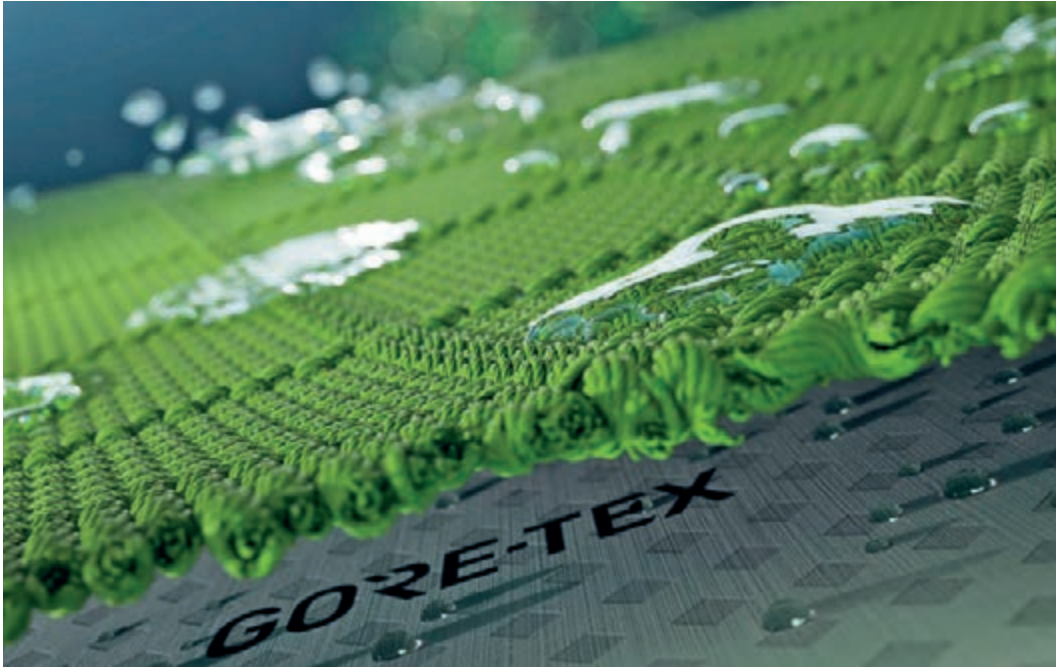
Interestingly, outdoor and winter sports label Dakine similarly chose to debut Gore ePE in snow sports gloves before any other category. The company was introduced to the material in late 2021, category director for performance at Dakine licensee and sports equipment producer JR286, Wallace Mills, tells us. Mr Mills says the main pull towards switching to an ePE membrane for the brand’s Baron Gore-Tex Index mitt was the promise of eliminating harmful PFCs, but he adds that the membrane is equal in performance to the insert Dakine used previously. Not unlike Reusch’s Discovery Gore-Tex Touch-Tec gloves, the Baron mitt is majority goatskin, with a four-way stretch polyester shell and a wool lining. It additionally boasts Gore’s Grip technology to prevent the insert from moving inside the glove, plus synthetic PrimaLoft insulation. By autumn-winter 2025, all Dakine snow gloves will rely exclusively on Gore ePE in the membrane. This, combined with continued use of a C-Zero water-repellent finish, will mean the total removal of PFCs from the range, according to Mr Mills.

Raising the game

Other significant ePE applications in recent months include Patagonia’s Storm Shift jacket, which won an ISPO Award in the autumn for its double-layer Gore-Tex ePE laminate and 100% recycled polyester shell, among several jury-pleasing technical details. Earlier, Gore launch partner adidas Terrex was also nominated for one of the prizes for its new Xploric Parley Gore-Tex suit. The two-layer material used for the jacket and

Reusch is already committed to using Gore-Tex ePE exclusively where required in all new alpine gloves, with plans to replace earlier inserts used in existing models gradually. The brand is also well-known for its goalkeeping gloves.

CREDIT: REUSCH



Gore is intent on advancing its latest fabric technology strategically. It envisions that PFC-free ePE membranes, combined with recycled textile content, will help lower its environmental impact over the long term.

CREDIT: WL GORE

trouser set, whose separate elements fasten together with a zipper, is made entirely from recycled polyester, obtained from marine waste by long-time adidas partner Parley for the Oceans. Terrex exhibited the suit during the fifth China International Import Expo in Shanghai last November. Another glovemaker, Ziener, unveiled ski gloves and mittens around the same time. Both its Gastilo mitten and Keala glove model feature leather palms and a 50% viscose and 50% recycled polyester fibre body, as well as Goldeck's synthetic G-Loft insulation. Arc'teryx included the material in its Ralle and Coelle jackets, while fellow outdoor company BlackYak released 343 D Eco GTX, a new hiking shoe which notably contains recycled content within the laminate.

Integrating recycled textile material in ePE membranes is already a reality for Gore, in line with the firm's "sustainable performance" ambitions. A small number of laminates in partners' current season collections were certified to Global Recycled Standard (GRS), Mr Loeffler reveals, but there is strong forward momentum in this area: 82% of clothing made with Gore's ePE laminates next autumn-winter will be GRS-verified. All will have been at least partially produced using recycled textile components. Regarding shoes, eight ePE footwear laminates will carry a GRS label. The manufacturer achieved full GRS certification for both its Shenzhen and Putzbrunn fabrics plants last year, with plans to undergo Scope certification at its Maryland site during fiscal 2025. Importantly, its ePE laminates not only bond well with select recycled face and backer fabrics, but also certain undyed or solution-dyed materials. The consumer-facing portfolio is expected to have obtained bluesign approval by next winter.

Mr Loeffler explains that Gore means to be "very strategic" about how it scales ePE in the months and years ahead. He points to the business' track record of honed ePTFE and its uses

over many years and suggests that ePE's potential will grow alongside developers' efforts to push past conventional comfort, performance and sustainability boundaries.

Identifying and aligning with partners on a similar journey is clearly a top priority to this end. Patagonia has already pledged to be first to market with a number of even newer GRS-certified Gore-Tex laminates that combine ePE with recycled polyester, for instance. Yarn manufacturer Bionic will supply polyester fibres solely derived from discarded plastics sourced from collectors in Costa Rican coastal and municipal communities. Perhaps most strikingly, though, Gore has announced plans to invest in a local plastic recovery and sorting facility that Bionic is setting up in the Central American country, presumably to help secure a ready stream of feedstock. 🌐



There has been a positive industry response to Gore ePE thus far and suggests bright horizons ahead for its manufacturer.

CREDIT: DAKINE



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Prize fighters

The ISPO events in Munich have re-emerged in changed forms since covid-19. The pandemic brought major disruption to ISPO Munich and OutDoor by ISPO in 2020, 2021 and 2022, prompting important changes to the timing and format of both events.

ISPO Munich moved from January or February to November, starting with the most recent edition of the exhibition in November 2022. OutDoor by ISPO's dates are also to come forward in the calendar to early June in 2023 and 2024, eventually settling into a May slot in 2025.

On announcing these changes, organisers, Messe München, also presented a revised format for the ISPO Award. They said: "The ISPO Award is breaking new ground with a modernised concept. From now on, the award will be presented all year round; winners will be selected and announced throughout the year." Companies will be able to choose when to submit their entries, with deadlines each quarter, rather than wait almost a full year, as they sometimes had to do in the past, to show off the innovations they had engineered into their products. The judges'



FOOTWEAR TECHNOLOGY

A revamped format for the ISPO Award programme has given footwear its own category. In 2022, 12 different shoe, boot and footwear technology ideas were among the winners.

panel will meet every three months, assess the entries that come in and name the products that win an ISPO Award. Winners will have the choice of being part of the Awards Gathering, a dedicated display of new trophy-takers, at either of the two exhibitions, choosing which show and which time of year suit them best.

In 2022, the first year in which the new format applied, a total of 95 products received an ISPO Award. In 2020, there were 42 'gold' winners and a further 51 shortlisted products. The overall numbers were, therefore, similar, but the revised 2022 format was clearer, with the categories better defined. And while shoes and boots have won plenty of ISPO Awards in the past, they were

spread out among broader categories whereas in 2022, for the first time, footwear was a category in its own right.

Twelve impressively diverse footwear products claimed a place at the 2022 Awards Gatherings and this article's purpose is to capture some introductory information about each of them.

Mountain merit

Swiss brand Scott Sports was among the winners for its Cosmos Re-Source ski touring boot. The judges scored the boot highly because 92% of the plastic parts it contains derive from biomass rather than from fossil fuels and because the power-strap is 100% recycled. Another ski boot to feature among the prizes was the Fischer One & Two Alpine boot for children, which has a hook-and-loop fastener, waterproof gaiter and lightweight shell as its standout attributes. There was a further winner representing children's cold-weather footwear in the shape of the Megapito winter boot from Finnish brand Reima. The panel liked this product's reliable protection from temperatures of minus-30 degrees in a lightweight, flexible, child-friendly design.

Still in the mountains, Scarpa's Phantom 8000 Thermic HD boot was among the winners. The boot is technically constructed and designed for high altitudes, hence the reference to 8,000 in the name. It is designed to keep the feet warm via two removable heated inner soles, but also to protect other muscles from cooling down with high-closing gaiters. Mountain brand manager at Scarpa, Francesco Favilli, has explained that stopping a climber from shivering means the risk of injury is reduced and performance and safety improve. Stimulate better blood flow, he said, and shivering stops.



The Cosmos Re-Source Ski Boot from Scott Sports.
CREDIT: SCOTT

“The ISPO Award is breaking new ground with a modernised concept. From now on, the award will be presented all year round; winners will be selected and announced throughout the year.”

One brand, four awards

One brand, Merrell, picked up no fewer than four winner's trophies. One of these was for a hiking boot called Rogue Hiker, which the brand presents as being ideal for backpackers because it has a high level of grip with its Vibram Megagrip sole. However, the boot is light in weight and 953 grammes per pair, which led the ISPO Award judges to say it feels like a trail-running shoe. This is not a coincidence because Merrell developed the Rogue Hiker using a trail-running shoe last rather than a traditional boot last.

Merrell also won for another version of this boot, the MTL Thermo Rogue 4, which is designed specifically for winter hiking. It will come to market in the third quarter of 2023. The brand describes this product as “a lightweight, sporty winter boot with robust features”. These robust features include a Vibram Arctic Grip outsole and Gore-Tex upper. MTL, which stands for Merrell Test Lab, is a tag that the brand applies to shoes that have come through its in-house incubator programme.

The third product in Merrell's quadruple win was the Agility Peak 5 ultra trail running shoe, which supports the current trend of fast hiking, the brand says. It has a high level of cushioning in the midsole and a Vibram Megagrip sole for traction. Senior brand manager, Nathan Buelow,



Merrell received four ISPO Awards for its innovative shoes.
CREDIT: MUNICH TRADE FAIRS LTD.

has said Merrell is thrilled to see increased participation in trail running and said he hoped a shoe like the Agility Peak 5 would convince even more runners to try the trail.

Trail running was also the focus of its fourth award-winning product, the MTL Skyfire 2. In this shoe, the brand is aiming for “technical sophistication” in a lightweight construction. Its lightweight materials (200 grammes per shoe) reduce fatigue while a plated midsole provides stability.

Forward running

Running shoes from other brands were among the ISPO Award winners as well in 2022. On's Cloudmonster has what the judges described as a “strikingly thick sole”, which they liked because of its cushioning and its unusual look. Other features include high damping of vibration, a strong rebound, a high level of breathability and its use of quick-drying recycled materials.

Berlin-based brand Winqs won for its Zerofly running shoe. Winqs is on a quest to move the athletic footwear sector away from petroleum-based plastics and strategic overproduction and into plant-based and recycled materials. The outsole is made of hybrid rubber and was developed with Michelin from rubber waste. The particularly lightweight Pebax midsole is made in part from castor seeds. For the inner lining, Winqs relies on bio-based Tencel derived from wood pulp. The shoe's two-layer upper also features a thin layer of 100% recycled polyester.

Good balance

Adidas and partners also featured, with the Terrex Free Hiker XPL Gore-Tex Parley boot, which, according to the judges, strikes a good



balance between functional outdoor footwear and urban design. It is a lightweight, waterproof hiking boot that uses fibres recycled from ocean plastic and an ePE membrane from Gore-Tex.

The On Cloudmonster
CREDIT: ON

Finally, among the footwear winners is InsoleFinder, a software tool from Hamburg-based Currex, which is aimed at end consumers and at specialist retailers. The software application involves motion analysis of the foot and picks out the insole that will work best for participants in ten different sports, including running, hiking, football, cycling and tennis. 🌐



Shoes from Berlin-based brand Winqs. The company wants to move athletic footwear away from hydrocarbon-based plastics.
CREDIT: WINQS SPORTS

THE

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SHOW



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Low-impact reused garments

A specialist group dedicated to textiles that the European Recycling Industries Confederation (EuRIC) set up at the end of 2019 has published a new lifecycle assessment (LCA) report. Important findings to emerge from the report include the statement that reclaiming a garment for people to wear instead of manufacturing a new one has an environmental impact that is almost 70 times lower.

The group, EuRIC Textiles, says the study confirms waste hierarchy assumptions. In that hierarchy, reuse has always been above recycling, and recycling above waste. Regrettably though, EuRIC Textiles president Mariska Boer points out that 62% of used clothing and textiles end up in household waste, meaning “valuable textiles” are likely to be incinerated or landfilled. She is the corporate communications executive for Netherlands-based textile recycling specialist Boer Group.

“The European textile reuse and recycling industry envisages a circular textile value chain where every piece of clothing is reused in an optimal way or recycled,” says Ms Boer. “This LCA study endorses the environmental benefits of a global market for textile reuse, and recycling’s potential to tackle the rising amounts of low-quality and non-reusable clothing.”

It calls on policymakers to accelerate investment in textile recycling facilities across the world. In particular, innovation in fibre-to-fibre



SUSTAINABILITY

If Europe is to fulfil its vision of a sustainable and circular textiles industry, the system for collecting and sorting used garments and putting them to good use needs an overhaul.

recycling will be key in keeping fibres in the loop, the report states.

Consultants from three agencies worked on the EuRIC Textiles LCA: Norion from Denmark, Vito from Belgium and EigenDraads from the Netherlands. They analysed 16 impact categories and used a weighting method adopted by the European Commission and software to calculate a single score for different products in ‘micropoints’ (μ Pt), a measurement in use in LCAs, linked to estimates for the annual environmental footprint of the average consumer in the US. Knowing the score of a garment tells you what proportion of a consumer’s annual impact that single product would represent.

In the EuRIC Textiles report, a high-quality T-shirt scores 9 μ Pt if it is reused. If it is new, its score is 628.4 μ Pt, which is 69.8 times more. In the case of a second-grade T-shirt, the reused garment has a score of 7.9 μ Pt, while the new one scores 549.6 μ Pt, which is 69.5 times more. The cheapest

At the moment, 62% of used clothing and textiles end up in household waste and valuable materials are being incinerated or landfilled.

CREDIT: BOER GROUP

category of T-shirt has a score of 9 μ Pt when reused, and a new one has a score 37.4 times higher at 336.7 μ Pt. Mariska Boer says she accepts that LCA results are often over-simplified. It is a scientific tool and, as the EuRIC Textiles experience of using it shows, involves a lot of hard work in gathering and analysing complex data. “But we want clear messages to come from it too,” she insists.

Positive waste

One clear message to emerge from this story is that reusing garments is a much better environmental option than making new ones, as the above scores suggest. In addition, the report tests the hierarchy and examines why reuse is also better than recycling. Ms Boer explains: “There is a market for second-hand clothing. Around 70% of the global population needs second-hand clothing because they don’t have the financial means to buy new clothing. For this reason, compared to plastics or metal, textiles represent a positive waste stream, one that has value and one for which there is demand.”

But there is a difference between clothing that people can and want to reuse and textile waste. Why has the whole world seen the photographs of mountains of unwanted garments dumped on beaches in Ghana and in the desert in Chile? The explanation the EuRIC Textiles president gives is that, while lots of people want second-hand clothing, it has to be clothing that meets their particular needs, including the materials the clothes are made from and how much they cost. Second-hand fashion has trends and seasons as well, she says.

This is why collecting and carefully sorting pre-worn clothing is important. “We need a refined, meticulous sorting process,” Mariska Boer continues. “And it needs to be carried out by well trained people who understand what consumers and wholesalers need. The difficult part is that what’s in demand is not always what you can supply.” If you cannot tell the difference, you end up with unsorted textile waste and, in her opinion, this is what the dumped and discarded piles of clothes in the famous photographs amount to.

To live in hope

There are well founded hopes that Europe’s 62% wastage of used textiles can improve. The European Commission’s calculation is that across the union’s current 27 member states, 5.4 million tonnes of textiles entered the market in 2019. Separately, it calculates post-consumer textile collection volumes as being between 1.7 and 2.1 million tonnes; this is what gives us the 62% figure for waste.

Improvement on this should be one of the outcomes of the Strategy for Sustainable and Circular Textiles, which the European Commission published in 2022. It quotes existing waste legislation that stipulates that member states must have in place by 2025 a separate waste collection for textiles. If we stick with the 62%



waste figure, it means 38% of textiles are already being collected. By 2025, the quantity of textiles collected after consumers no longer want them is likely to increase. It seems undeniable that clothing consumption has more or less doubled since the start of the century and, driven by fast fashion, consumers are now discarding more clothing than ever.

EuRIC Textiles president, Mariska Boer.

CREDIT: BOER GROUP

Where fibres come from

EuRIC Textiles is pinning its hope for improvement on two things. Figures that the LCA report quotes say that of all the post-consumer textiles that collectors gather at the moment, between 50% and 75% goes back into use. Between 10% and 30% goes for recycling. However, there are reasons to fear that the extra volumes after 2025 will not necessarily boost textiles reuse and not necessarily meet the demands of consumers in the second-hand clothing market, as outlined above. The report blames a trend of falling quality and in this, too, fast fashion is in line for a share of the blame.

Of the products that are being reused, only 5% are of high enough quality to re-enter the clothing market in western Europe. Second-grade products usually go to eastern Europe and the Middle East, and lower-grade ones go to buyers in Asia. Many lighter-weight products at the more affordable end also go to Africa. Optimism is thin on the ground that quality second-hand clothing’s 5% share of the reused textiles market can increase. EuRIC Textiles points to fast fashion as

the main culprit. Churning out clothes quickly and cheaply so that consumers will snap them up and wear them for a short time means that, when those consumers move on to something else, much of the clothing coming onto the market for reuse will be cheap, with obsolescence engineered in.

In parallel, at the higher end of second-hand clothing, there is less need to collect, sort and redistribute garments and shoes because there are specialist e-commerce platforms and vintage shops in many cities that are connecting buyers and sellers of these products every day and doing very well out of it.

But there are other routes to reuse. EuRIC Textiles would like the European Commission, as part of its Strategy for Sustainable and Circular Textiles, to make it mandatory for producers of new garments to use a proportion of recycled fibres that come specifically from used textiles. In this way, clothing manufacturers will become avid users of their own waste. Mariska Boer calculates that only 1% of the fibres going into apparel production at the moment would fulfil this criterion. "That figure really needs to go up," she says. "And we haven't really seen the industry react yet. You see claims on the label about recycled content, but if you check, it's not usually from textiles. It will probably take a mandatory system with a legal framework to make it happen. Once they face a mandate, companies will develop a business case for recycling."

End of life

In a similar way, she would like the often-quoted idea that producers of finished garments should take responsibility at end of life for the products they sell to become mandatory, too. What she likes about this is the impact it would make on design. "What we've seen in recent years is that design has been about the look and feel of a garment, not its reusability or recyclability," she observes. "We can see this in the rise of mixed fibres in clothes. Twenty years ago, a pair of jeans would almost certainly have been 100% cotton. Now, almost all jeans contain elastane and elastane is a show-stopper when it comes to recycling."

Returning to the point about used garments not always being right for second-hand clothing consumers and wholesalers, complicated compositions leave sorting companies with the difficult and expensive task of arranging recycling. A coat might have wool in its outer layer, but a mix of synthetic materials in the lining, making it necessary to dismantle the whole product before you can recycle the materials. This is why there needs to be a better conversation among designers, producers and recyclers and, in Ms Boer's opinion, a harmonised legal framework across the European Union. Even if some of the 27 member states are launching their own in-country initiatives (one came into force in Spain at the start of this year, for example), most clothing brands and retailers operate across the EU.

Hierarchy assumptions

Consultancy McKinsey has estimated that the obligation for member states to collect textile waste separately from other waste by 2025 could take volumes of collected textiles to 8.5 million tonnes or more by 2030.

In 2030, recycling these materials will still be better than discarding them, and reusing them will still be better than recycling them. In other words, the hierarchy assumptions referred to will remain valid. Of course, as Mariska Boer points out, there are steps even higher up this hierarchy. "Prevention is higher up," she says, referring to consumers making do with the clothes they already have rather than casting them aside for something new. "And for that to be possible, re-introducing longevity and durability to the materials and garments we make is an important step, too. Long-lasting products will, naturally, be easier to keep in use, and the longer we keep them in use, the better."

A time before

Her use of the word "re-introducing" is interesting. It suggests taking our apparel consumption back to a time before mass consumption. In contrast, it is, by definition, in the interest of multinational companies that are driven by growth and high market capitalisation to keep customers coming back to them to buy more.

"It's a challenge," the EuRIC Textiles president admits. "But the vision of a circular textiles industry is a good one and we will keep working to make it a reality." 🌐



Decathlon recently brought to market a ski jacket that it says is designed for 100% recycling.

CREDIT: DECATHLON/RESORTECS

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Reinvent to innovate

Sports brand Nike isn't the first to use terms like "game-changing" and "revolutionising" to describe a big launch, but when the brand presents a new innovation as its most significant since Dri-Fit, industry watchers were bound to pause for a closer look.

In September last year, the company unveiled Nike Forward, a platform through which fibre is essentially needle-punched directly into a wearable textile. The brand says it spent five years developing the platform and that the process was the result of 'hacking' traditional needle-punch machines. The breakthrough, it stated, was figuring out how to harness a technique more common in automotive and medical industries to create what it claims is premium, sustainable sportswear. In the resulting material, which has a lighter density than traditional knit fleece, multiple thin layers are entangled rather than woven or knitted together; the inaugural products are made with five thin layers, though the company says this can be adjusted to create future pieces of varying thickness and composition.

Removing in-between steps traditionally used to develop knits and wovens condenses the process, thereby reducing the material's carbon footprint by 75% when compared to the brand's traditional knit fleece. The first-generation version is composed of 70% recycled content and has no zippers, aglets or extra trims so that pieces can more easily be recycled. The carbon footprint of the material, according to the company, is based on "a cradle-to-gate assessment review by PRe Sustainability. Trims and other minor components are excluded from the result".

The launch featured a men's and women's hoodie and crew neck, both available in grey. (Promotional videos show additional pieces and a men's trouser made an appearance on the brand's website, though as of late November clicking the link for the jogger-style bottoms led to a "the product you are looking for is no longer available" message.) The tops have a fairly unisex, baggy, boxy fit, and the women's version of each is shorter than the men's. The website describes the collection as featuring "raw edge pockets, exposed seams, and other intentional design choices that help us generate less waste in the manufacturing

There is no question that Nike Forward, which debuted last autumn with an inaugural hoodie and crew style, is an interesting textile development. But can the current iteration — with its raw details and grey-only colourway — be the 'game changer' the brand claims it to be?

process and pave the way for future circularity" and says each garment is "designed to break in as you wear it".

The material requires more care than the average Nike hoodie. The company advises garments be washed after five wears in cold water to preserve the material's structure and prevent shrinkage, then laid flat to dry rather than put into a dryer. Pilling is said to be "a natural part of the material's life cycle" which can be addressed with a fabric comb or brush.

The brand has gone all out on its launch, with team members talking in every interview about what a "game changer" Forward is. While the excitement is understandable — there is indeed much to celebrate about the new platform — it's worth looking outside the company to ask: What constitutes a game-changing development and can Nike Forward really bring about a significant shift in the world of sportswear?

What works... and what doesn't

"It's good that Nike uses this collection to demonstrate ways of creating classic and iconic pieces with a positive impact on the environmental footprint," says Anne Prahl, a London-based sustainable design consultant who holds a PhD in Sustainable Design. However, she feels the term 'game changer' comes across as "rather enthusiastic marketing".

Dr Prahl works with start-ups, brands and manufacturers in the sportswear and fashion materials sector, helping them to weave more sustainable approaches into every aspect of their work. This patented technology, she says, is "very

Forward is Nike's "most significant innovation since Dri Fit".

CREDIT: NIKE



much based on needle-punching, a process that has been utilised for decades to create nonwoven textiles for the automotive, medical and geotextile industries. [Nike] seems to have taken an existing technology and tweaked it for use in a totally different product category and industry."

She feels a true paradigm shift will require a change in how recycled materials are used; the recycled polyester that currently makes up 70% of Forward is made from recycled plastic bottles and she would like to see fibre-to-fibre recycled polyester. Take-back programmes would allow end-of-life pieces to be repaired, reused and recycled into materials for new sportswear products, she says. "Nike has talked about the possibility of making the material from manufacturing waste and how the elimination of trims can enable the recycling process in the future, so maybe this inaugural collection needs to be seen as a starting point for something much more impressive."

Equally pressing is whether the product is ready for the general public, which Dr Prahl became more sceptical of after assessing the product in person. Nike has outdone itself to produce sleek images and videos to show the collection in its best light, she says, but she adds: "Holding my newly purchased women's hoodie in my hands, I first noticed how lightweight yet stiff it felt, and strangely, how noisy and crunchy the fabric was. When wearing the garment, it felt restrictive, despite the boxy loose cut, as there really is no give in the material. I couldn't shake off the feeling that I was wearing a paper-based material, reminiscent of nonwoven Tyvek garments worn as protective clothing."

This is not too surprising as needle-punched materials are typically rather rigid, she says, "and unfortunately even the boxy, spacious cut could not hide the fact that the material just does not move with the body. In fact, the combination of fit, material and attempts at keeping traditional elasticated cuffs

“This patented technology is very much based on needle-punching, a process that has been utilised for decades to create nonwoven textiles for the automotive, medical and geotextile industries.”

ANNE PRAHL

and hem, doesn't make for a comfortable, fit-for-purpose piece of sportswear." She also felt the £124.95 price tag was excessive, considering needle-punched nonwovens are typically used for cost-effective, disposable products.

"There are some positives," says Dr Prahl. "The hoodie felt surprisingly warm and cosy despite its perceived flimsiness. Nike does rate the collection's thermal efficiency as higher than comparable fleece materials and we may see some more fine-tuning of the layer-enabled material technology in the future."

What consumers want

When Nike Forward was first announced last September, omnichannel retail experts Anne Mezzenga and Chris Walton discussed the launch on their Omni Talk Fast Five podcast. The pair, who are co-founders of the Omni Talk Retail blog and various podcast productions under the same umbrella, were joined by two guests, and the conversation moved among several key aspects:

- the impressive sustainability metrics ("I'm excited about the numbers – around 75%", one guest said, while the other praised progress that "isn't greenwashing [and is] really moving the needle");
- the importance of sustainability to millennial consumers ("Gen Z and millennials care more about this than some [older] executives understand," said Ms Mezzenga);

Retail experts Chris Walton and Anne Mezzenga.

CREDIT: OMNI TALK RETAIL





- and whether the product in its current state will appeal to consumers (it's "raw," they all agreed, and consumers might not be willing to give the material the extra care it requires).

WSA caught up with Ms Mezzenga and Mr Walton after the podcast aired to further discuss these points — and whether Nike Forward really is a "game changer".

To Mr Walton, a game changer would be a product that "delivers more than 90% functionality at a fraction of the cost". A great example, he says, was the Crest Spinbrush: "It delivered most of the functionality of an electric toothbrush for [around 10%] of the cost and opened people's eyes to how an electric toothbrush works." For Nike Forward to be a true game changer, he says, the new material would have to "recreate all the same colours, feels and washability of a standard garment".

If the Forward range continues to be only available in grey, he told WSA, "the concept is dead on arrival." The range must ultimately come in a variety of colours or "it will have limited consumer appeal. People won't pay more just for grey when they can get cheaper colour options somewhere else."

Ms Mezzenga agrees that the new platform in its current form is not there yet. "Nike claims the needle punching cuts down their process significantly because it's removing several steps, however, there's a reason those steps exist. It creates the garments consumers have come to know and love," she says. "Lululemon, for example, started using recycled materials and more sustainable processes to create products, but they are finished and are worth the price they are charging. I look at the Nike Forward product, and there is still a raw quality, difficulties in care for the garments, and a high price point. One of these things needs to change for this product to start gaining the traction Nike wants it to."

This is likely to be the case even for Gen Z consumers towards whom the new line seems

primarily targeted. Even though that demographic is often more "aspirational in their sustainability ideals," she says, "when the time comes for purchase, many are still choosing price as their priority, not sustainability. This is why it's important for textiles producers, retailers, brands, to be able to figure out a long-term strategy that helps create products that allow consumers to check both boxes, lower-priced products and those that are sustainably made."

Not a game changer — yet

Back to the question of whether Nike Forward in its current form is a game changer. Most seem to agree it's a "not yet".

Despite the work still to be done, Ms Mezzenga hopes other textiles producers will be inspired to explore how they can remove one or two steps from their own processes. "Seventy-five percent reduction in process may not be possible, but it's to everyone's benefit to start making changes that eventually can scale to that level and maintain the quality and sustainability of the garment."

Mr Walton says he is "waiting to see how big a gap there is between the initial story and what's next." That will help him determine "if it is just PR or a real effort with staying power."

Dr Prah feels the design team still has work to do. "The collection's flaw is that Nike has used what it describes as a game-changing material but has tried to apply this to traditional silhouettes. As the material's drape, touch, feel and performance are so different from those of traditional fleeces, it should be explored through more radical design options and construction methods. This could in turn lead to the apparel innovation that Nike intended this to be."

As a former Nike employee and self-described "superfan," Dr Prah eagerly awaits whatever will come next from the platform. "I do hope," she says, "that they have something up their sleeve to really move this material on to become fit for purpose and the game changer they promise." 

With raw-cut pockets, the material reminds sustainable design expert Dr Anne Prah of paper-based products.

CREDITS: ANNE PRAHL

“PFAS is an extreme chemistry that should only be used in extreme conditions, like asbestos.”

DR RÜDIGER FOX, SYMPATEX CEO

In 18 months, it's over

For many the writing was on the wall. A growing body of science has found PFCs and PFAS, otherwise known as 'forever chemicals', to be highly persistent and to accumulate in the environment and in living organisms. Now, a number of respected organisations advocating for cleaner and safer processes and products in the textile and apparel industries are making moves to proscribe PFAS chemistry in the short- to mid-term. In its new regulations for 2023, sustainable chemistry organisation Oeko-Tex has issued a general ban on the use of perfluorinated and polyfluorinated alkyl substances (PFAS/PFC) in textiles, leather and footwear for its Standard 100, Leather Standard and Eco Passport certifications.

Switzerland-based bluesign has announced that from this July all PFAS-based chemicals will be phased out from its bluesign finder resource for sourcing approved products and, from July 2024 on, all formerly approved bluesign fabrics treated with PFAS formulations will be removed from the bluesign guide. A new policy implemented by Zero Discharge of Hazardous Chemicals (ZDHC), otherwise known as the Roadmap to Zero programme, states that "the use of any formulation based on, or including PFAS, is not permitted for fashion, sport or outdoor clothing, apparel and home textiles".

In addition to these restrictions, new legislation in the US is also restricting the use of this class of chemicals now. Laws addressing the presence of these unwanted chemicals in textiles and apparel have been voted in California, Maine and New York, while regulation at a national level is also being considered by the Federal congress. In the European Union, REACH has pushed back its latest update, but PFAS is on the list of unwanted chemicals at the European chemicals Agency ECHA. This February, the agency officially published a proposal to restrict PFAS covering no fewer than 10,000 products.



DIALOGUE

With new legislation in the US and stricter measures implemented by sustainable chemicals organisations ZDHC, bluesign and Oeko-Tex, the use of PFAS and possibly fluoropolymers is on its way out. For Dr Rüdiger Fox, CEO of Sympatex, these bold and courageous steps signal the definitive demise of chemicals that he says should have been banned years ago.

The regulatory landscape is changing, is this what you see as a decisive step that may make PFAS chemistry a thing of the past in outdoor apparel?

What we are seeing is that a timeline for the phase out of PFAS now has specific cut-off dates. California has banned their presence from early 2025 and the UN's Environment Programme (UNEP) is funding exit programmes in countries such as Bangladesh, Indonesia, Pakistan and Vietnam to the tune of \$43 million¹. The EU is preparing an extension of REACH regulation but real courage has now been shown by Oeko-Tex, bluesign and the ZDHC, which will no longer certify materials containing any form of PFAS, whether in coatings or fabrics, from mid-2024. This is a courageous step because it is not natural to consider the proportionality of the means by which our industry markets products to consumers in search of market share, using disingenuous arguments. We have known since the 1960s that fluorochemicals pose health risks in the medium and long term and, moreover, once they enter the food chain, they continue to accumulate, hence the term "forever chemicals". Yet many brands unflinchingly justify their use for their water- and oil-repellency benefits.





You have said that alternatives have existed for a long time. Why has there been a reluctance to use them? Why have designers and other decision-makers preferred to continue using PFAS?

Adequate solutions have been brought to market in recent decades that can ensure water repellency and waterproofing at the same high level. Even for high-performance requirements, there are proven alternatives, both for the durable water-repellent finishing of textiles and for the replacement of PTFE membranes. All we have lacked so far is the courage to make the final decision in our design offices to initiate the change that is long overdue. When I began working in this industry seven years ago, my initial thought was that companies would operate according to logic, and that logically

PFAS chemicals would be phased out. But there is little-to-no public discussion on this issue; our industry is responsible for covering it up. Sports and outerwear brands have known since at least 2010 that the chemistry is toxic. The background is that some very commercially successful brands' identity is linked to fluorochemicals. There are many reasons why they continue to market these materials, one of which is to maximise profits. There continue to be, to this day, international tenders that require ePTFE membranes. Certain parameters for ePTFE are better (its resistance to heat is one), but I don't believe they are necessary. A firefighter wearing a laminated garment that can resist 150°C won't survive if temperatures reach that level. The parameters we've created are artificial.

CEO of Sympatex, university lecturer, author and innovative thinker, Dr Rüdiger Fox is an aerospace engineer and business economist with a PhD on corporate happiness. In his 30-year career, he has served as CEO of medium and large companies in aerospace, telecoms, textiles and engineering.

ALL CREDITS: SYMPATEX TECHNOLOGIES

The performance sportswear industry has long been fixated on providing consumers with high-tech equipment that can withstand extreme conditions and uses. In your opinion, what is the best way to communicate effectively with the end consumer on a matter, related to chemicals, that is complex?

PFAS is an extreme chemistry that should only be used in extreme conditions, like asbestos. The industry has created a market demand that is difficult to change. I believe we need to rewrite the story. Sustainability has a long history of promoting 'negative' stories; we see this in organic produce where an organic apple is, by default, expected to be an ugly apple. But what do we really need? Justifying extreme and highly unlikely use cases is not the solution. Do we need outdoor wear to look brand new all the time? Do we change the oil in our cars when we are in the mountains? And if we consider oil rig workers, we are not talking about fashion. I say an SUV should be dirty. What I see is that we are still basing our arguments on worse-case scenarios, ski school instructors' suits for instance still seem to require C6-based DWR. The question we need to ask is what is the price that society should pay for unneeded performance? What we are talking about is a few stains versus the future of the planet. It is far beyond what we need.

How confident are you that PFAS chemistry will be banned in Europe and elsewhere?

I am absolutely 100% confident. Political willingness is now strong, it is under way at REACH and in the EU's Textile Strategy. We should expect it to come. Legal consequences could be high. Two years from now will be too late. With today's media, brands had better start acting now. The new rules at Oeko-Tex, bluesign and ZDHC apply to the Fall 2024 ranges of outdoor brands.

What is at the root of greenwashing? And what is the key to bringing greenwashing to an end?

I love greenwashing! It signals the beginning of conscious change. It is a first sign of transition. A few years back, in 2016 or 2017, there was very little talk of sustainability. Things have changed, now everybody recognises the need. And as a next step, as seen in France and in Norway, brands are now being asked to justify their sustainability claims.

Which other products should performance textiles producers move away from? Which substances are in danger of becoming the new PFAS? Is there a risk that some products could be banned without good reason?

As a newbie in the industry, I don't see any other health issue that comes anywhere close to that of PFAS. It is clearly a family of chemicals that we need to get rid of. The other issue that could become a cause for concern is the plastic-free movement. Plastics are certainly bad for the environment, but not all plastics end up in the oceans. The clothing we wear today is two-thirds synthetic. Is it possible to replace manmade fibres



with natural ones? Natural materials have their own issues, such as leather and cotton, and I don't think a banana fibre will be a viable solution. With the industrialisation of the past 50 years, it will be difficult to find alternatives that are scalable. I don't think bio-based synthetics will be a solution either. Plastic is not all bad; it can be recycled. We need to support the industries that can and do recycle. There is certainly room for progress. What we need, I think, is a scientific discussion of the impacts of plastics and synthetics and a collaborative roadmap towards circularity in our sector. PFAS is by far the real devil. Future generations will ask us why they have to pay the price for the fact that we started looking for alternatives so late and how the continued use of PFAS for so long can be justified, just for the sake of keeping clothing drier. Kicking the can down the road on this issue is no longer acceptable and the time to act is now. This is the sentiment that I felt clearly at ISPO last November. The battle is over. In 18 months, PFAS will be gone. 🌍

Based in Unterföhring, Germany, Sympatex is a maker of a waterproof-breathable membrane made from polyester and/or recycled polyester. It markets laminates for outerwear and workwear apparel, accessories and footwear that do not use any PFAS chemistry.

References

1. Textile-producing nations unite to reduce chemical waste, source United Nations Environment Programme (UNEP). <https://www.unep.org/news-and-stories/press-release/textile-producing-nations-unite-reduce-chemical-waste>

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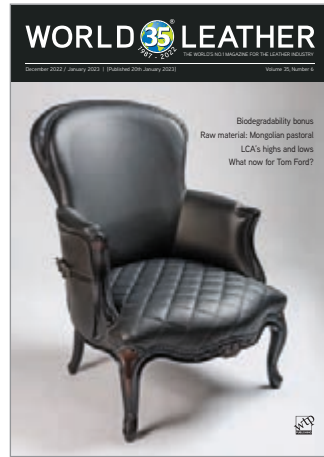
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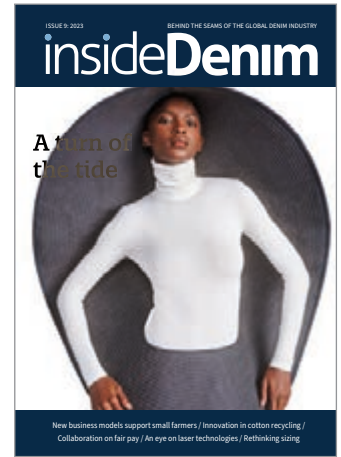
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