

WORLD FOOTWEAR

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THE MAGAZINE FOR THE GLOBAL SHOE INDUSTRY

Micam: heads turn

Biomaterials benefits
Soil-saving bison boots
Performance brings a buzz



Contents



Television star Romina Mosso Morais Gomes was one of a number of celebrity guests at Micam in Milan in February. Here, she models shoes from Le Marche-based brand Gio+.

CREDIT: MICAM

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02 Global News

Highlights from around the world of footwear. For news on shoes every day, go to footwearbiz.com, the best news website in the business.

04 Footprints

People making an impact on the industry: designers, industry leaders and famous footwear lovers.

06 Industry & Innovation

Details of innovations from suppliers and service providers across the globe.

08 Backtrack

Headlines from footwearbiz.com, summing up the most recent developments in the global footwear sector.



MATERIALS, MANUFACTURING & INNOVATION

10 Foot fascination

Shoe designers must take the foot's physical reality into account.

12 Foam-grown

Algae have caused substantial challenges to fresh water supply, but biomass-based EVA foam producer Algix has found a way to put the material to good use.

16 On the map

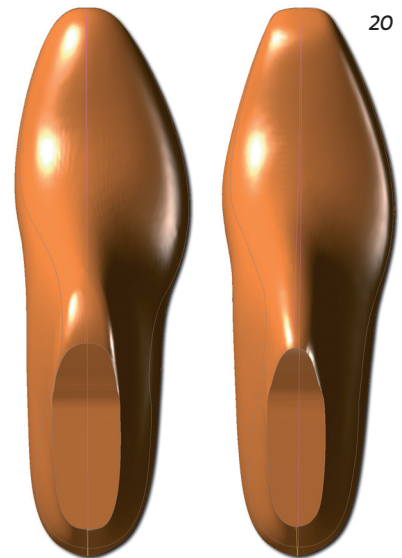
Advances in supply chain mapping technology are helping brands and manufacturers put extra transparency into their materials sourcing.

20 Type-cast lasts

A small number of last categories that accurately reflect the main foot types would go a long way towards making off-the-shelf shoes fit better.

24 Biomaterial breakthrough

Textiles based on natural raw materials are viable products that shoe companies can use now, CTCP argues.



24



ATHLETIC & OUTDOOR

28



28 Where the buzz is

Performance gains for athletes are what produce the biggest buzz for shoe design teams, but need not undo the sustainability progress brands are making.

SAFETY & WORK SHOES

34



32 A wild idea

Planet-conscious Patagonia is using limited-supply bison leather to create special work boots.

34 AI in safety shoes

W.L. Gore & Associates has run a project to examine how well artificial intelligence can work with its Extraguard safety footwear upper material.

BUSINESS OF FOOTWEAR

36 Chemical concerns

According to the European Chemicals Agency, a surprising percentage of footwear on offer to consumers in the European Union falls short of its regulations.

38 Data-driven

Leather manufacturer PrimeAsia is making progress in presenting its footwear customers with data and evidence to show its progress in sustainability.



ADVERTISER'S INDEX

APLF	23
FOOTWEARBIZ.COM	IBC
PERFORMANCE DAYS	15
SILVATEAM	31
STANBEE	BC
TFL	27
WORTHEN	09
WTP	19



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World Trades Publishing 2024

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Global news

France Footwear manufacturer Arche has gone into administration but will continue working while the process takes its course. The company's management team took the decision to do this on February 1, saying the complicated situation in the domestic and international markets had put it into financial difficulty. Arche employs more than 100 people at its facility in Château-Renault, near Tours.

UK The second British Footwear Association (BFA) sustainability summit will take place in the city of Birmingham on April 17. Open to BFA members and non-members alike, tickets are priced at £180 or around \$230 each. A programme of expert-led presentations and discussions will contribute to "a 2024 environmental, social and governance outlook to help companies better plan for challenges and opportunities", the organisation said.

Monaco Athletic footwear brand Hoka became main sponsor of the 5,000-metre event at the Monaco Run Gramaglia series of road races. This year's races took place on February 10 and 11, with the 5k event on the morning of the second day. World Athletics only began accepting 5k road-race records, distinguishing them from track-times, in 2018. Since then, the Monaco event has witnessed world record-breaking performances.

Switzerland Swiss brand management group Arklyz has bought Germany-based leather shoe brand Lloyd Shoes with an aim to grow its wholesale, omnichannel and international business. Founded in 1888, Lloyd sells its collections in 48 countries at around 2,800 points of sale. It also sells leather jackets, bags and belts to match the shoe collections. The company employs over 1,500 people including almost 500 in Germany. In 2020, it closed one of its German factories.

Germany Sports group Puma has reported 2023 full-year revenues of €8.6 billion, an increase of 6.6% year on year. Its footwear category contributed almost €4.6 billion, up by 12.4% compared to 2022. Apparel's contribution to the total was €2.75 billion, which is a slight fall, of 0.3%, compared to the previous year. Puma also earned €1.25 billion from sales of accessories, a rise of 3.1%.

Spain Official figures from the Spanish government show a decline in the number of people working in footwear manufacturing there, but an increase in those working in leathersgoods production. There were 40,307 people working in the leather and footwear sectors in Spain at the end of 2023, down by 2% year on year. There were falls of around 6% in the major footwear production centres (Elche, Elda, Petrer and Arnedo) but increases in towns and cities where leathersgoods manufacture is an important source of employment.

Portugal Luís Onofre has been re-elected president of Portuguese footwear, components and leather goods manufacturers' association (APICCAPS) for a new three-year term. The footwear and leathersgoods sector in Portugal comprises just over 1,500 companies, employs 40,000 people and exports more than 90% of its production. The sector has presented a new strategic plan for the next decade to make the Portuguese footwear industry a major benchmark in the development of sustainable solutions.

Kenya The authorities in Kenya have confirmed that men's marathon world record holder, Kelvin Kiptum, died in a road traffic accident on February 11. He was travelling in a car with his coach, Gervais Hakizimana, in western Kenya when the accident occurred. Mr Hakizimana died too. Kelvin Kiptum set a new record of 2:00:35 at the 2023 Chicago Marathon in October. He wore a prototype pair of Nike Alphafly 3 running shoes for the race.

US Footwear brand Dr Martens has reported revenues of £662.9 million for the first nine months of its current fiscal year, the period ending December 31. This figure represents a fall of 12% year on year. Chief executive, Kenny Wilson, said weak results in the US had been an important factor. He said wholesale revenues in the US market were around half of what they had been a year earlier, with total sales there showing a fall of 31%. He added that “the weak consumer backdrop” there had made business in the US challenging for Dr Martens.

Brazil National footwear industry associations from Mexico, Argentina, Brazil, Colombia, Guatemala, Ecuador, Venezuela, Chile, Nicaragua, Uruguay, Peru, El Salvador and Paraguay have announced that the Latin America Footwear Forum for 2024 will take place in São Paulo on May 20 and 21. This will be the twenty-sixth edition of the event, which aims to provide a platform for representatives of footwear manufacturers across the Americas to share knowledge, experience and good practice.

Pakistan Reports suggest the Pakistan Tanners' Association (PTA), has decided not to continue its co-leadership of the Pakistan Mega Leather Show. It shared organiser responsibilities for the ninth edition of the event in Lahore in January with the Pakistan Footwear Manufacturers' Association. Instead, it may seek to launch a new footwear materials event in Karachi in 2025. The Pakistan Footwear Manufacturers' Association might continue to host the Lahore event on its own.

India According to the Council for Leather Exports (CLE), India's leather and footwear industry is expected to experience significant growth, reaching \$47 billion by 2030, up from the current levels of around \$17.3 billion. The footwear sector (including both leather and non-leather) is expected to contribute around 50% of the total. CLE published a new 'vision document' for the industry at the start of the year.

Japan Sports footwear and clothing brand ASICS has been announced as the winner of Japan's Open Innovation Prize for its GEL-LYTE III CM 1.95 shoe. This award is presented by Japan's national sports agency and is sponsored by six different government ministries in recognition of creative initiatives that can serve as role models and help accelerate innovation in Japan. This is the sixth occasion on which they have presented the award. The brand brought the GEL-LYTE III CM 1.95 to market in September, describing it as the shoe with the lowest CO₂ emissions in the world.

South Korea Fila Korea and parent group Fila Holdings, the owner and operator of sports brand Fila and subsidiary company Acushnet globally, inaugurated its new headquarters in Seoul in February. Located in Bomun, in the capital's Seongbuk neighbourhood, the building spans ten stories above ground and three below. The business expects team synergies and overall working efficiencies to increase following the move, which effectively unifies its operations under a single roof.

Hong Kong Footwear and leathersgoods group Stella International has reported full-year revenues of just under \$1.5 billion for 2023, a decline of 8.9% compared to the previous year. In terms of volume, Stella shipped 49 million pairs of footwear in 2023, down by 12.5% compared to the figure for 2022. On a positive note, the average price per pair that it achieved went up, from \$28.50 in 2022 to \$29.70.



Footprints

Two measures of Micam's success

The Micam exhibition closed in Milan on February 21, with this, the ninety-seventh edition of the event hosting more than 1,000 footwear brands and welcoming more than 42,000 visitors. In the course of the show, there were also 20 free workshops for visitors to attend.

President of Italy's national footwear manufacturers' association Assocalzaturifici, **Giovanna Ceolini** (pictured), commented that high levels of innovation at an event like Micam were one of the measures of its success.

She added that the ability to attract footwear industry professionals from all parts of the world was something else that pleased her about Micam.



CREDIT: MICAM

Leather matters to New Balance

Athletic footwear brand New Balance has shared details of its leather consumption. The Boston-based company bought part of Wolverine Leathers, the in-house leather supply division of the Wolverine Worldwide group, in September.

Speaking at the science-based talks at Lineapelle in Milan in February, a senior executive specialising in sustainability at New Balance, **Katy O'Brien**, said the company currently makes around 100 million pairs of shoes and boots per year. Not all of these products are made from leather, but she said New Balance's leather consumption currently stood at 60 million square-feet of finished leather per year.

As part of the acquisition of the US part of its leather business, Wolverine "assigned its US tannery contracts" to New Balance. This will help the athletic footwear company secure the supply of the quality and quantity of leather it needs.

Endurance athlete signs up with Baffin

Cold-climate footwear and apparel company Baffin has named Ironman athlete **Connor Emeny** as its newest brand ambassador.

Already, at the age of 26, the youngest person to complete an Ironman on six continents, the Canadian endurance athlete set off for Antarctica earlier this month, taking Baffin footwear and clothing with him.

The challenge he will take on will involve swimming a distance of 3.86 kilometres in water at a temperature of zero degrees, cycling 180 kilometres on ice and running a marathon in freezing air temperatures.

Baffin has equipped the athlete and his team with cold-weather apparel, high-performance winter boots, insulated slippers and rubber boots for the sea voyage south from Ushuaia in Argentina.

"The cold is what we know," said Baffin senior vice-president **Mark Hubner**, "and as Connor faces the unique and formidable challenges of this expedition, we are proud to provide him with gear that will protect him from extreme conditions along the way."

B Team appointment

Patagonia CEO **Ryan Gellert** has joined The B Team, a group co-founded by **Richard Branson** and **Jochen Zeitz** that states "business has both the capacity and the responsibility to become a driving force for social, environmental and economic benefit". B Team CEO, **Halla Tómasdóttir**, said: "Ryan exemplifies courageous leadership. His unwavering yet humble commitment to the well-being of people and nature sets the gold standard for sustainable business practices."

Brand visibility

Puma has appointed **Julie Legrand** as its new senior director of global brand strategy. Ms Legrand was previously global brand director at H&M and, before that, she held senior roles at consumer products brand Procter & Gamble. Puma described her as a senior leader and said she would define and execute a strategy to drive higher brand visibility and strengthen the perception of the Puma brand around the world.

Advisory services

Austrian Fibers Institute president and former Lenzing chief sustainability officer, **Robert van de Kerkhof**, has joined Swiss textile innovator HeiQ's board of directors. Mr van de Kerkhof left Lenzing in January to focus on delivering sustainability, circularity and decarbonisation advisory services with Pepper-i2, a company he formally founded in August.

At the helm of H&M

Swedish clothing and footwear group H&M has named **Daniel Ervér** president and chief executive in place of **Helena Helmersson**, who has left the company after 26 years of service, the last four spent as chief executive. Ms Helmersson's decision was a personal one, she said, but not easy. Mr Ervér took the helm in January. He most recently led group flagship brand H&M, for which he retains responsibility.

Farewell and thank you

This issue of *World Footwear* is the last one for which we will be able to lean on the wide footwear industry knowledge of technical editor, **Philip Lattaway**. Since 2002, Mr Lattaway has worked tirelessly to bring his decades of direct experience of footwear production into the pages of the magazine, sharing his knowledge generously with the whole World Trades Publishing team.

In the early part of his professional life, Philip Lattaway worked in his family's shoe manufacturing company in England and went on to run the business. After this, he joined components manufacturer Ideal Tape, a division of American Bultrite, as international sales and marketing director, a role that took him to footwear factories and industry events in all parts of the world.

Business owners he met were quick to recognise his expertise and were immediately at ease talking to him about the challenges they faced in sourcing materials, in bringing increasing levels of innovation and efficiency to their production lines, and operating in an ever-more environmentally responsible way.

World Trades chief executive, **Simon Yarwood**, commented: "We thank Philip for his years of dedicated work and for the authority his expertise has given World Footwear. We wish him well in whatever he chooses to do next."



CREDIT: WTP

China as 'manufacturing superpower'

The professor of international economics at the IMD Business School in Lausanne, **Richard Baldwin**, has said China is still a pivotal player in global manufacturing. He has argued that moves to shift outsource manufacturing operations to other parts of the world could prove difficult owing to China's role in interconnected global supply chains.

At the end of 2023, Professor Baldwin worked with the Organization for Economic Co-operation and Development (OECD) on an update to its Trade in Added Value database, which aims to track how much added value countries offer in the production of goods and services that are consumed worldwide.

In the recent update, the OECD calculated that the US market, for example, accounted for 17.1% of China's gross export value in 2020, but that factoring in "backward linkages" and value added content, the true figure was 20.8%.

One implication of these findings is that brands and retailers who want to move product sourcing away from China may find it difficult to achieve the same levels of added value by importing from other countries. Commenting on this recently to media in China, Professor Baldwin said: "China is the world's sole manufacturing superpower. Decoupling from China would be difficult to say the least."

At the double

Membrane specialist Sympatex has expanded its sales team with the appointments of **Eric Brendel** and **Leandra Reisner**. Ms Reisner is a textiles and clothing technician, who most recently worked as a sales representative at textiles agency Weichert Agencies. Eric Brendel has more than 26 years' experience in the outdoor industry. Sympatex membranes have been used in clothing, shoes, accessories and technical applications since 1986. ■

Human climate change

Interim chief executive of World Federation of the Sporting Goods Industry, **Emma Zwiebler** has said a new report highlights "an improving industry outlook" despite a challenging economic and business landscape, and that the sporting goods industry demonstrated resilience in 2023, paving the way for growth in 2024. But she added: "Physical inactivity could be seen as the 'human climate change' and we all need to work together to combat it."

Different company

Footwear group Wolverine Worldwide has reported total sales revenues for 2023 of more than \$2.4 billion, a fall of 16.5% compared to the figure for 2022. Chief executive, **Chris Hufnagel**, said Wolverine Worldwide was in the process of executing a transformation plan. He added: "Wolverine Worldwide is a different company than it was just six months ago, with a healthier balance sheet, enhanced efficiency to deliver higher profit and investment, and a redesigned organisational structure to strengthen our brand-building capabilities."

High-end shift

Former Louis Vuitton chairman and chief executive **Michael Burke** has succeeded **Sidney Toledano** at LVMH Fashion Group, home to high-end footwear brands including Loewe, Fendi, Givenchy, Celine, Kenzo, Marc Jacobs, Emilio Pucci and Patou. Mr Burke took over on February 1, as Mr Toledano stepped into the role of adviser to the luxury group's founder, chairman and chief executive, **Bernard Arnault**.

Founder moves on

Equip Outdoor Technologies in the UK has named **Richard Leedham** chief executive in the wake of founder **Matt Gowar's** decision to step down after 30 years in November. The company owns outdoor brands Lowe Alpine and Rab, known for its packable, down-filled Hut slippers, boots and socks. ■



Industry & Innovation

A real solution

Slip-resistant footwear brand Icebug has confirmed that it will open a new store in Stockholm in April, adding to the concept store it already runs in Gothenburg.

Norrandsgatan in the centre of the Swedish capital will be the new store's address. It will offer customers a shoe repair service as well as the full range of Icebug collections.

Chief executive, David Ekelund, has told Swedish media that Icebug's expansion is not the fruit of aggressive marketing, but results instead from a simple truth. "Our growth is down to the fact that we have a real solution to a real problem," Mr Ekelund said.

"People want to get out every day, even in slippery conditions, and to do so in shoes that are responsibly produced."

He said the brand's biggest competitor is not a rival shoe company, but the temptation people face of sitting at home instead of venturing out.



CREDIT: ICEBUG

Fibre tracer

Mallorca-based footwear brand Camper is one of the first to adopt a new tracing system from fibre group Lenzing. This involves the use of a new physical fibre tracer in the uppers of a Camper shoe and of a new certification system that goes with it. Lenzing has developed the fibre tracer and the certification system itself.

The Camper shoes have a minimalist-style mini hang-tag attached to one of the eyelets with a printed QR code. Consumers can scan the code and receive instant verification that the shoes are genuine, which is to say that they really are from Camper and that the uppers really do contain Lenzing's Tencel lyocell fibre.

BASF to exit joint-ventures in China

Chemicals group BASF has announced that it is taking steps to get out of butanediol (BDO) production in China. BDO and its derivatives are used for producing plastics, polyurethanes, solvents and spandex fibres.

Towards the end of 2023, BASF started the process of divesting its shares in two joint-venture companies in China, BASF Markor Chemical Manufacturing and Markor Meiou Chemical. It has assessed the market environment and product carbon footprint of BDO and its downstream products from different production sites worldwide. It said: "BDO value chains are under increased competitive pressure and are characterised by global overcapacities."

It added that the carbide-based BDO and derivatives the two joint-venture companies in China produce "have a significantly higher product carbon footprint" owing to the use of coal as a base raw material and the high energy-intensity of the production processes involved.

It said that it will customise its global portfolio of BDO and affiliated downstream products to provide "competitive low-PCF offerings". It said the rest of its operations in China would be unaffected by this decision.

Lasting difference

UK sports brand Inov8 has unveiled its next generation of hard-ground trail running shoes, the Trailfly and Trailfly Speed. The shoes form part of a revamped footwear collection, launched in January. Like the other shoes in the 2024 collection, these models feature a new anatomical foot-shaped fit that promotes a more natural feel.

Foam in the frame

Performance foam manufacturer Dahsheng Chemical took advantage of its presence at the North East Materials Show in Boston and the North West Materials Show in Portland in January and February to launch Durapontex N33 Bio. It said this new foam uses 44% bio-based materials in its composition adding that it was suitable for use in performance insole products and would lend itself to ultra-lightweight design, while scoring well for resiliency and sustainability.

New growth

Basque outdoor brand Ternua has announced an alliance with safety footwear group Robusta and has said it will aim to develop new growth in workwear. As part of the agreement, Ternua will be able to avail itself of the commercial network Robusta has set up in workwear to distribute its new line of products, Ternua Workwear. For its part, Robusta believes it will benefit by being able to direct footwear buyers to its partner's clothing collection.

Stricter rules

Members of the European Parliament want to increase the waste reduction targets proposed by the Commission to at least 20% in manufacturing (instead of 10%) and to 40% per capita in retail, restaurants, food services and households (instead of 30%), compared with the annual average generated between 2020 and 2022.

3D printed and biodegradable

Footwear brand Vivobarefoot has announced a groundbreaking partnership with materials science company Balena at the Biofabricate Summit in Paris in January. They have created what they claim is "the world's first barefoot, 3D-printed, industrially compostable footwear". The products will be made from a bio-based, industrially compostable thermoplastic that biodegrades.

Their aim is to start selling the footwear in 2025. Until now, most 3D printing filaments have used conventional plastic materials. "We knew we needed to look for other options," says Dulma Clark, the brand's lead for impact investment and storytelling. "This one is extremely promising."



CREDIT: VIVOBAREFOOT

Heat reduction

Functional materials developer Sympatex showcased two new technologies at the Lineapelle exhibition in Milan in February. One of these, Moisture-tech, offers fast sweat absorption and quick drying times in footwear materials. In addition, tests have shown it to offer wearers extra comfort through reducing heat inside the shoe by 45% compared to other technologies, Sympatex claims.

The second technology, Non-woven, eliminates the use of polyurethane foam in the production of laminates. Sympatex said this has delivered a 10% reduction in carbon emissions and a 15% reduction in water consumption. It has replaced the polyurethane layer with non-woven material developed from 100% recycled polyester.

Coats takes new ideas to Lineapelle

Coats Footwear presented 45-55% recycled cellulosic material 4forest at the Lineapelle exhibition in Milan in February.

The wood-based product is Forest Stewardship Council-approved and "ideal for insoles in women's shoes", Coats said. It has been developed to maintain dimensional stability under minimum mean peak pressures of 300 kilopascals (kPa), according to the Mullen burst test, versus virgin-fibre materials with a comparable two-millimetre gauge.

Other highlights included Cyclea, a reinforcement material made from post-industrial leather surplus, which can be produced with up to 100% recycled content if recycled polymers are also used. Shoe assembly technologies ProWeave, Powerflex, Cotton T438, EcoVerde and Rhenoprint Multizone were also on display.

Japan plan

Developer of PFAS-free water repellency technology for clothing and footwear materials Green Theme Technologies (GTT) has won support from an external trade body in Japan that it believes will help it develop its business in the Asian country.

GTT's Empel textile finishing platform has already made an impression in Japan after zipper technology group YKK used it in a new collection of zips, DynaPel. YKK won an ISPO Textrends Best Product Award for DynaPel last year.

Now the Japan External Trade Organisation (JETRO), a government-related body that promotes trade and investment between Japan and the rest of the world, has given GTT approval for its Invest Japan support programme.

The Texas-based textile technology developer has said this will give it access to JETRO resources, through which it will aim to set up an office in Japan and forge further relationships with prospective Japanese partners. ■

The new rules would include extended producer responsibility (EPR) schemes, through which economic operators that make products available on the EU market would cover the costs for their separate collection, sorting and recycling.

Moisture management

Bavarian chemicals supplier Rudolf has unveiled a host of new, durable, bio-based formulations as part of an update to its Hydrocool moisture management line of performance chemistry for textile applications. Finishing agent Ruco-Pur Bio SLB, suitable for synthetics, cellulose and blended fibres, contains 43% bio-based content; soil release agent Feran Bio ICR has 87%. Both provide "maximum wash resistance", Rudolf added.

Single synthetic

Decathlon-owned outdoor brand Quechua has unveiled a mono-material hiking shoe, made using only a single synthetic, versus the six typically required by its NH100. The new model, named the NH One, is the latest version of the NH100 style. According to Decathlon chief executive, Barbara Martin Coppola, Quechua sold three million pairs of NH100s last year. The NH One's material composition "means that it is far easier to recycle and can then be used to create other sporting products like swimming fins, giving [the material] a new lease of life."

Mattress-effect

Footwear brand Kiprun, part of the Decathlon group, has launched its first new shoe of 2024, the KS900.2. Kiprun will move away from a broad athletic footwear focus, Decathlon has said, and dedicate itself from now on to running and trail shoes. It added that the KS900.2 "embodies this new positioning perfectly". The shoe is specifically for road running. It is an update to a 2023 shoe, the KS900 Light, with the principal difference coming in forefront cushioning. To achieve this, the brand has increased the thickness of the sole in the forefoot. ■



Backtrack

29 February 2024

Bata group joins LWG

28 February 2024

Brazilians reap \$31m from Micam

New name and focus for SAC

27 February 2024

Adidas keeps sale of 2022-era Yeezy stock in-house

26 February 2024

Reintroduction of the Puma Suede

22 February 2024

Applications open for second Maestri d'Eccellenza

21 February 2024

First in-house footwear from Arc'teryx due in March

Bricks and mortar success for Skechers

20 February 2024

Micam runs for the ninety-seventh time

16 February 2024

Only Natural invites synthetic-free submissions

15 February 2024

Another privatisation bid for Tod's

14 February 2024

Longchamp sees Chinese sales rise by 84%

Flat sales for Jimmy Choo but 'strong brand equity'

13 February 2024

Sales of Gel-Kayano 14s triple in a year

09 February 2024

Falls in North America for Under Armour but growth elsewhere

Nike to give \$3m to NFL-led indigenous sports training

08 February 2024

Challenging year ahead, Tim Boyle predicts

07 February 2024

Ganni combines Tencel and recycled leather fibres

World Footwear's publishing cycle and limitations on space make it impossible for us to run more than a carefully selected sample of news from across the industry. However, we publish hundreds more stories on www.footwearbiz.com. The site is updated every day with news from every continent and every part of the industry, making footwearbiz.com one of the most comprehensive archives of news anywhere on the web for the global footwear industry.

We list below just a few of the headlines that have appeared on the site in recent weeks — www.footwearbiz.com allows you to read the news items you may have missed.

06 February 2024

Ecco pairs up with Minotaur for Japan-only golf shoe

Fall of 5% for adidas, preliminary 2023 figures show

05 February 2024

Nike selects Air Max Dn for Dynamic Air take-off

02 February 2024

Skechers celebrates record-high annual sales

01 February 2024

Amer Sports lists in New York after discounted IPO

31 January 2024

Busy start to the year for Assomac

30 January 2024

Descente opens first store for seven-to-14-year-olds

Adidas responds to kangaroo leather concerns

29 January 2024

Men's footwear to follow new Lululemon Asia-Pacific outpost

26 January 2024

Pakistan Mega Leather Show expects top-level delegates

25 January 2024

Shoe-focused intellectual property office opens in Lucheng

24 January 2024

Yue Yuen revenues dropped 12% last year

Au-Delà du Cuir announces 2024 intake

True Religion steps into footwear

23 January 2024

Shoes are still a critical focus of advancements for athletes

22 January 2024

Donghua's Miao research informs Tata collection

Fall in revenues of 20% likely for BASF

18 January 2024

Elton John's leather boots to go on sale

17 January 2024

Anta looking forward to brand's official US launch

Timberland plays its part in new Pharrell collection for Louis Vuitton

Riva Schuh celebrates 100th edition

16 January 2024

Strategic creative shake-up at Lululemon

15 January 2024

Fila readies new Fila+ label for lift-off

Another Wolverine brand goes to new owners

12 January 2024

Significant growth for Pikolinos

11 January 2024

Christmas cheer for Crocs

10 January 2024

Fresh management spots opportunities for DC Shoes

Rapid store expansion for cowboy boot brand

09 January 2024

Xtep retail sell-through up 20% YOY in China

UPACO

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and bonding solutions to
brands worldwide



NO MATTER



THE TERRAIN.



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BIODEGRADABLE, BIO-CONTENT, ZERO-VOC

ADHESIVES & PRIMERS:

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ECOBOND® FILMS:

SOLE / MIDSOLE ATTACHING FILMS

STITCHLESS® FILMS

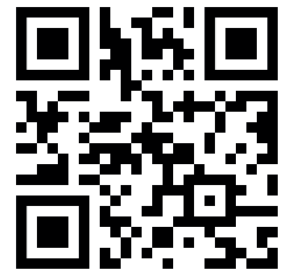
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CREDIT: SHUTTERSTOCK / ELIZAVETA GALITCKAIA

The remarkable foot

Feet are one of the less attractive parts of the body and yet are vital to our very existence. The leg and the foot are the levers that enable us to move around. The foot in particular is also highly complex. It contains no less than 26 bones joined by 107 ligaments and linked to 19 muscles by a series of tendons in order to create movement. There are nerves that link it to the brain which tells it what to do and blood vessels that carry the minerals and proteins that maintain the tissues protecting its central bone structure. Understanding how it operates is fundamental to producing good footwear.

Bone structure

The bone structure of the foot is divided into three groups (*Figure 1*).

- Tarsus with seven bones, including the calcaneum or heel bone.
- Metatarsus with five bones and comprising the middle of the foot.
- Phalanges with 14 bones which make up the toes.

Bone itself is formed by the deposit of calcium phosphate which forms a light but strong honeycombed structure. It is a long process which continues into the very late teens. A child's foot, therefore, has little real structure, so correctly designed lasts and carefully fitted shoes are essential. This bone structure also forms two arches. The longitudinal arch falls between the heel bone and the head of the first metatarsal (*Figure 2*). Its height varies from person to person with some people having particularly high arches and insteps while its absence in some is the cause of flat feet and other foot problems. The transverse arch lies across the base of the metatarsals when the foot is relaxed. Under load, it flattens out and the foot becomes wider as the bones spread.

Feet and motion

When we walk, the foot provides support for the body and propulsion to move it forward. It works in a rolling fashion with the outside of the heel hitting the ground first. As the forefoot contracts, the foot rolls

Figure 1: Bones of the foot

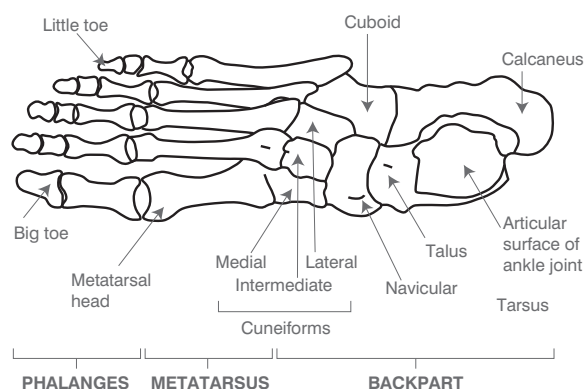


Figure 2: Arch of the foot

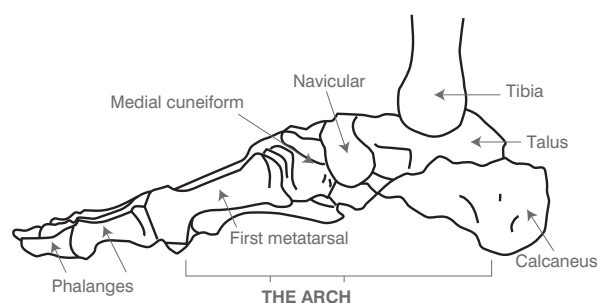
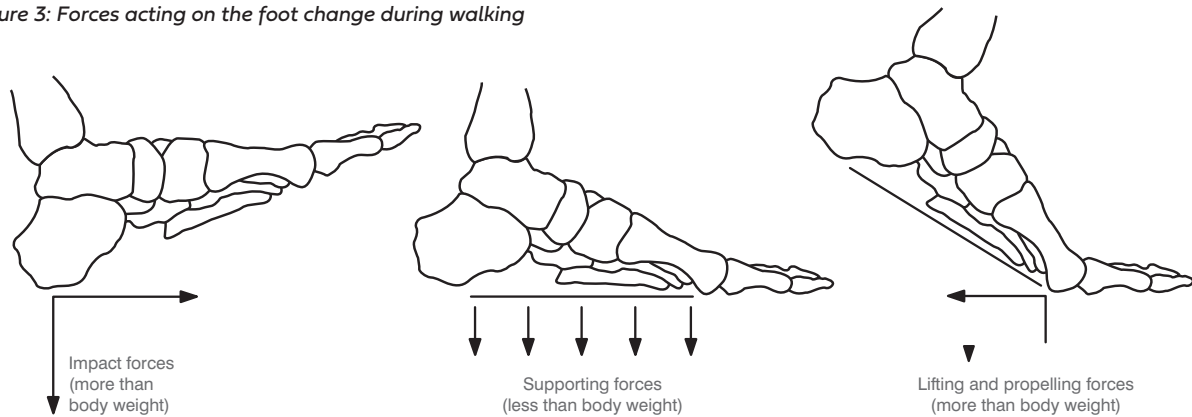


Figure 3: Forces acting on the foot change during walking



inwards and the point of greatest pressure follows the outer edge of the foot up to the outer joint. As the heel lifts to flex the foot, the pressure transfers across to the inner joint and finally to the big toe as the body is propelled forward. (This explains why it is so difficult to walk if you hurt your big toe). Exploiting this foot action to the maximum is a key factor for sports shoes.

An average day may involve up to 10,000 steps and the transmission of surprisingly large forces through very delicate and fragile areas. Excessively long periods of standing, running or jumping and walking on uneven surfaces can therefore cause problems, especially if a person is overweight. When walking, feet come under the impact of one and quarter times body weight, so extra weight means ankles, bones and joints come under increased pressure (Figure 3).

They also need to provide more shock absorption for the body. That in turn means more wear and tear and a greater likelihood of foot or ankle pain. In addition, the bones of the foot are held together by ligaments, so extra weight can force joints apart and make these ligaments stretch. This can change the shape of the foot so that it becomes wider and the arches to begin to collapse. Beyond the age of 80, the foot becomes more flexible and the arch much weaker due to the ageing process.

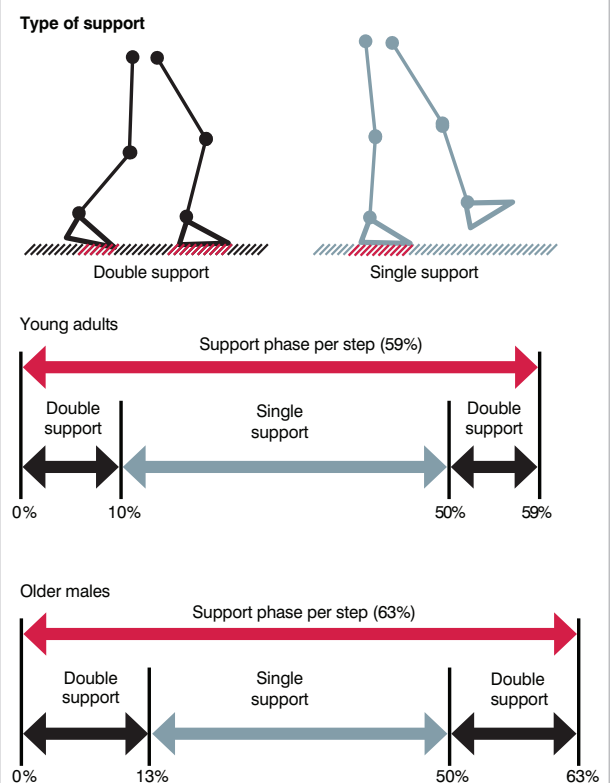
Footwear must therefore always be functional in order to work with the foot rather than against it. This might seem obvious, but fashion often tries to ignore this and results in footwear that has the potential to cause damage to the foot. It is therefore essential that as well as providing good fit and comfort, a shoe must cause as little disruption to foot function as possible. The last shape in particular has the most profound effect and must therefore take into account the type of person who will wear the finished footwear and the purpose for which it will be worn. Sports shoes, for instance, require a different set of parameters to dress shoes, as do children's to adults', and men's to women's.

As we age, the way we walk tends to become more cautious. The foot spends more time in contact with the ground so that less and less time is spent resting on a single leg which helps older people to cope better with uneven surfaces (Figure 4). The downside is a reduction in walking speed as they now take shorter steps. This is more pronounced in women than in men. The width of

the step is also increased and the foot itself is not raised so far when it is lifted off the ground. As a result, it tends to be carried forward closer to the ground surface so increasing the risk of tripping, a common cause of falls.

The foot is indeed a remarkable part of the body and one which we all too often take for granted until something goes wrong. It is also one that is frequently abused through wearing ill-fitting, unsuitable or poorly designed footwear. Much of this is down to the choice of the wearer who in an age of online shopping has no professional to advise them. However, there are still instances of designers slavishly following the dictates of fashion without due regard to the requirements of the foot itself. There is no real excuse for this. After all we only have one pair of feet to last a lifetime. ■

Figure 4: Changes in foot contact with the ground





Highly polluted Lake Tai in China was once a major source of drinking water and provides a classic example of the threat that algae blooms can pose.

ALL CREDITS: BLOOM

A limitless source of raw material

Algae blooms have become a major environmental problem and their explosive growth can be linked to increasing global temperatures and rising pollution. Their origins lie in pollutants such as fertilisers used in industrial farming running off the land, chemical discharge from industry and human sewage from a rapidly growing global population as well as a warming climate.

In the US, the problem originated in highly polluted lakes leading to blooms that spread as water was dumped into surrounding waterways to prevent flooding. The result has been an uncontrollable spread of these algae blooms which have had a devastating effect on local ecosystems, with marine life dying and local residents reporting breathing problems.

China has had a similar problem for more than 20 years on Lake Tai, in the Yangtze delta plain. It is the third largest fresh water lake in China and was once both picturesque and the main source of drinking water for millions of people. In 2007, however, two million of them were forced to go without this essential commodity due the severity of the algal bloom that had formed on the lake.

The cause of this catastrophe was intense industrialisation in the region in the late 1980s which resulted in up to 36 billion tons of wastewater being dumped into the lake each year. This resulted in a condition called eutrophication whereby nutrients such as nitrates and phosphates caused an algae bloom to form that removed oxygen and reduced water quality to such an extent that no organisms could live in it.

Discovering a new resource

They do say that every cloud has a silver lining and it appears that even something as pernicious as algae bloom does indeed have one. It can be used to make foams and rubbers that have many industrial applications, among which is footwear. In 2007, the same year that two million Chinese people were denied drinking water from Lake Tai, an American named Ryan Hunt began researching algae technology as a way of solving problems caused by environmental pollution. He believed that it might be possible to use algae to help remove the harmful levels of phosphorus and ammonia present in industrial and agricultural wastewater that was causing the problem.

After extensive research, he in fact discovered that this protein-rich algae biomass, when subjected to significant degrees of heat, pressure and time, underwent a process of plasticisation. Had he stumbled upon a new source of raw material that had industrial uses? Indeed, he had.

In 2010, he teamed up with Mike Van Drunen, an engineer and entrepreneur to co-found Algix, with the aim of harvesting algae as a means of cleaning the environment while, at the same time, providing algae-based sustainable materials. They spent two years developing a harvesting and drying system and refining an extrusion process to create a commercially viable operation.

In 2016, Bloom, an Algix brand, launched Bloom Foam, the world's first algae-blended EVA to the footwear industry as a sustainable ingredient in flexible foams for high rebound applications. *World Footwear* first looked at the company in 2017 and, since then, it has partnered with a wide range of brands for products ranging from footwear to surfboards, helping them to create eco-conscious products that have a positive impact on the environment.

Harvesting and processing

Subsurface algae which forms the blooms lies about 15-20cm below the surface of the water which allows it to be sucked up by industrial-grade pumping units. It is squeezed to form a green 'sludge' which is then dried to produce crunchy flakes. These are further processed to create unique blends of powder which are mixed with various polymers to produce a variety of foamed materials or in pellet form, for injection processes. The algae biomass obtained by this harvesting provides the foundation for company's formulations.

Footwear products

Bloom Rise – (Bloom Foam has been renamed Bloom Rise). It is the company's environmentally-conscious, high-performance replacement for petroleum-based EVAs. The company says that algae's natural thermoplastic qualities allow Rise to meet and, in some cases,



Algae harvesting units are the first stage in turning it into a useful raw material for footwear and other industrial and consumer products.



After harvesting, the initial sludge is dried into flakes, converted into powder form and combined with polymers and pelletised for use in a wide range of products.

exceed the performance characteristics of conventional closed-cell flexible foams. It is described as being an algae-blended resin that contains a significant fraction of algae biomass and bio-based additives thus offsetting a significant portion of traditional EVA required for footwear foams.

It uses an ethylene vinyl-acetate (EVA) base resin combined with an algae biomass. This resin is ISO 14021 Certified and has a renewable

content of at least 45%. It can be used for durable applications such as sheet foaming, injection foaming and sheet extrusion. It can also be used directly or as a master batch to be let down to required loading levels in the end product. Rise can be used where bio-content, flexibility, enhanced elongation and durability are required. It is recommended for use in IMEVA and CMEVA (injection moulded and compression moulded) applications.

Bloom Rise: Mechanical properties based on a 30% loaded injection moulded part.

Melt flow index	2.5	g/10min (2.16kg@ 190°C)	ASTM D1238
Density	1.13	g/cc	ASTM D1505
Tensile strength	7	MPa	ASTM D638
Tensile modulus	49.6	MPa	ASTM D638
Elongation	399	%	ASTM D368
VA content	26	%	N/A

**Typical Values, not to be construed as specifications.*



Bloom materials are used in the production of components such as midsoles and insoles.

Manufacturing the actual foam involves crushing the dried algae flakes down to a powder form and then extruding them into a chosen carrier resin to create an algae-plastic master batch (the actual details of this process are protected by patents). Conventional foaming techniques are then used to expand it into the final flexible foam.

Bloom Stride – this grade of resin uses a styrene butadiene styrene (SBS) base resin with an algae biomass and a renewable content of at least 45%. It is again ISO 14021 Certified and can be used for durable applications such as sheet foaming, injection foaming, sheet extrusion and injection moulding. It can also be used directly or as a master batch to be let down to desired loading levels in the final product. It can be used for applications where bio-content, flexibility, enhanced elongation and durability are required. It is recommended for use in TPR outsole moulding applications for casual footwear.

Bloom Stride: Mechanical properties based on a 30% loaded injection moulded part.

Melt flow index	1.8	g/10min (2.16kg @ 190°C)	ASTM D1238
Density	1.1	g/cc	ASTM D1505
Tensile strength	4.35	MPa	ASTM D368
Tensile modulus	275	MPa	ASTM D368
Elongation	386	%	ASTM D368

**Typical Values, not to be construed as specifications.*

Bloom Spring: Mechanical properties based on a 30% loaded injection moulded part.

Melt flow index	2.5	g/10min (2.16kg @ 190°C)	ASTM D1238
Density	1.13	g/cc	ASTM D1505
Tensile strength	0.94	MPa	ASTM D638
Tensile modulus	15.3	MPa	ASTM D368
Elongation	51	%	ASTM D368

**Typical Values, not to be construed as specifications.*

Bloom Spring – this grade of resin uses thermoplastic olefin (TPO) with an algae biomass and a renewable content again of at least 45%. Also ISO 14021 Certified, it can be used for durable applications such as sheet foaming, injection foaming and sheet extrusion. It again can be used directly or as a master batch to let down to desired loading levels in the end product. Spring can be used for applications where bio-content, flexibility, enhanced elongation and durability are called for. It is recommended for use in IMEVA and CMEVA footwear applications.

Bloom Ascend Rubber – this is a slightly different type of material from the three preceding foam products in that it is a seaweed-blended rubber using harvested sargassum that washes up on beaches. This again leads to blooms that, in the same way as on inland waters, emit toxic fumes and greenhouse gases as they decompose. This can have a serious impact on tourism, local industry and fishing as well as on human health and coastal ecology. It is produced as a master batch that is dark green to brown in colour with a 33% algae content for use in rubber soling applications.

Overview

Algae is the fastest growing photosynthetic organism on the planet. It can double in size in less than 24 hours, which is what makes it such an ecological menace. This staggering rate of growth also makes it one of earth's most renewable resources. Since its launch in 2016, Bloom has come a long way. It now works with over 100 brand partners, has cleaned over 1 billion litres of water and captured over 1 million kilograms of CO₂. The company also says that its foam products can be recycled although, as in most recycling processes, a reduction in physical properties and performance will occur. A product that helps clean up the world and, at the same time, provides a limitless source of raw material has to be a win-win for everyone. ■



Lee County, Florida, before and 24 hours after algae harvesting.

Performance Days expands shoe sector

PERFORMANCE DAYS will showcase innovations, highlights, and trends from the functional fibre segment for the Spring/Summer 2026 season. With the addition of a dedicated Footwear Area, there is a larger exhibition space available at the Messe München fairground in Halls C1 and C2. Notably, all exhibitors presenting their material highlights at PERFORMANCE DAYS continue to focus on the development and production of sustainable and environmentally conscious materials. Alongside expertise in the fibre sector, the expo plays a crucial role as an information platform, fostering inspiring industry exchanges. The event will feature the popular Expert Talks Area, the forward-thinking Trend Forum with this year's Focus Topic "Beyond Bottles," the Innovation Zone, a dedicated Footwear Area, the Sustainability Lounge, and for the first time, the Reality Zone, a special workshop area in cooperation with Accelerating Circularity.

Take two: Footwear Area established as a permanent fixture

The industry showed great enthusiasm for the new look and numerous opportunities for intensive exchange at the fall trade fair. The newly integrated Footwear Area, featuring its own Footwear Forum showcasing innovations and highlights from the shoe sector, received particularly positive feedback and premiered in October. Now, in the spring, PERFORMANCE DAYS integrates the shoe segment for the second time, aiming to strengthen its role as an innovation platform for sustainable materials and developments in this field. Nina Conrad, sustainability consultant in the textile and leather industry and co-initiator of the new Footwear Area, sees tremendous potential in integrating footwear into the trade fair: "The introduction of the new shoe area was warmly welcomed by both exhibitors and visitors last fall. It seamlessly complements the existing offering in the clothing sector, and some clothing exhibitors have even joined the shoe segment, creating a dynamic synergy. This unique opportunity significantly simplifies the search for materials, components, and suppliers for shoe designers and product managers, which no other trade fair currently offers. The shoe forum has also received exceptionally positive feedback and is praised as informative, innovative, and inspiring. Of course, there is room for expansion, but we are determined to progress step by step."

Marco Weichert, CEO of PERFORMANCE DAYS, supports the expansion into footwear: "We are on the right track to establish PERFORMANCE DAYS as a top information platform and an important industry meeting point. Supplementing our offering with the

ADVERTORIAL

The spring edition of PERFORMANCE DAYS will take place on March 20th and 21st, 2024 at the Messe München. Once again, in focus: a dedicated Footwear Area, which will have its own section for fabric, fibre, and material innovations with an environmentally conscious approach, along with a Footwear Forum.



footwear segment confirms that we are making the right decisions when it comes to providing first-class information for exhibitors and visitors. There are significant transferable elements between apparel and footwear, so it is important to provide a dedicated area for footwear. Many materials are also used in the footwear sector, creating numerous overlaps." This sentiment is echoed throughout the industry - the opportunity to assess innovations from the fibre and material sector in both performance wear and footwear was well-received. In the spring, brands such as Lederfabrik August Renz KG, Monteiro Ribas, SneaKnit, Modern Meadow, and Kuori GmbH have already confirmed their attendance as exhibitors. ■

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Footwear supply chains
often operate globally.
ALL CREDITS: EUROFINS BLC

Supply chain traceability – what's to hide?

Lily Cuthbertson, Eurofins BLC Leather Technology Centre

Due to the complexity of footwear supply chains often operating globally and across varying concerns relating to environmental, social and governmental (ESG) issues, the risks posed to a brand or retailer are often unknown. This is frequently due to lack of traceability or limited knowledge. However, a significant uplift in both new and upcoming legislation is driving larger companies to achieve greater traceability upstream of their supply chains to include raw material sourcing. Moreover, legislation is pushing companies to build sustainability commitments and share such information with stakeholders and consumers for a more holistic consideration of ESG responsibilities.

As legislation requirements grow, traceability exercises are likely to become core elements of risk management systems. Outputs from such projects can be utilised in ESG reporting, allowing consumers the opportunity to become active participants in the effort to support and produce more socially responsible and environmentally sustainable industries, including leather.

In order to commit to sustainability improvements and identify opportunities to reduce risk, the footwear industry has a need to identify and establish which parts of the supply chain pose the highest risk. Traceability solutions have been developed over many years to provide greater visibility of the operators within each layer of the value chain. Supply chain mapping is a key and advanced traceability tool which can be used to not

only identify the economic actors within a supply chain but to conduct risk assessments and provide prioritised due diligence actions based on findings.

Understanding supply chains

Although various laws and regulations governing supply chains are being implemented globally, a similar pattern can be found regarding increased responsibility of economic operators. The movement obliges brands and retailers to better assess their supply chains to identify the interdependencies likely to be exposing them to risk, undertake measures to remediate them and publicly report on their due diligence systems annually. Examples of such legislation include the European Corporate Sustainability Reporting Directive (CSRD), the German Supply Chain Due Diligence Law and the European Union's Regulation on Deforestation-free products (EUDR).

The process of understanding and tracing a supply chain has numerous benefits to a business that go beyond providing visibility and meeting legal requirements. From a brand protection perspective, understanding risk exposure allows a company to respond to potential issues before they arise and, from a commercial perspective, knowing where goods originate can provide a stronger position to drive increased quality and potentially rationalise a supply chain. This can also help when leveraging sourcing contracts, allowing for

more favourable terms due to the potential of greater buying power and influence in negotiations.

In the past, sustainability may have been considered by consumers as more of an additional feature when making purchasing decisions. However, it has been reported that a significant shift in consumer purchasing behaviour is fast approaching, favouring brands committed to sustainability. Today, consumers are more aware and concerned about the social and environmental impacts of the goods they purchase and have become more conscious of transgressions, worker exploitation and environmental concerns. As a result, brand accountability is progressively expanding in scope, highlighting the need for due diligence as businesses are held accountable for issues regardless of whether they are aware of them or not.

As consumer attitudes change, traceability exercises undertaken by brands will help consumers to make more informed purchasing decisions. It has been reported that sustainability will be considered more a baseline requirement for purchase, highlighting the need for brands to invest adequately in sustainability and traceability in order to demonstrate sustainability commitments.

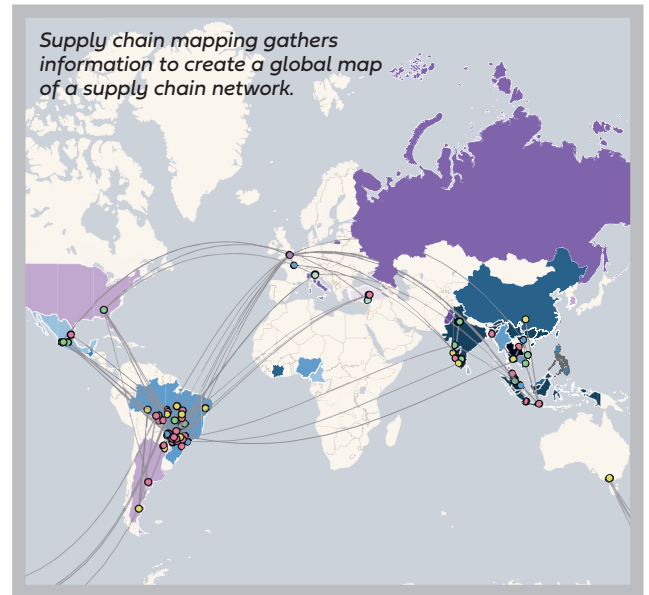
Sustainability

The greatest sustainability impacts of a product, and for a company, is upstream of the supply chain at the manufacture and sourcing level, as well as downstream in terms of consumer disposal. Although a brand or retailer may not be able to influence the downstream impacts effectively at present, through achieving upstream traceability to raw material origin and identifying the actors involved in the value chain, a company is in a position of greater power to influence all upstream impacts.

Various ESG risks can be attributed to the footwear industry due to common operation in developing economies of which environmental and social standards or legislation may be less stringent. Although there are groups that work to standardise laws protecting workers and the environment protection, laws are often applied in varying degrees within jurisdictions where some can be rarely enforced and/or monitored. As such, the sustainability impacts have the potential to be significant.

One concern is that the manufacturing stages of the footwear industry can be polluting due to the many different materials and components produced. Traceability upstream of material supply chains can uncover various environmental challenges often relating to concerns surrounding deforestation, chemical use, water pollution and environmental pollution. Social responsibility in this sector can also be challenging as the industry can be labour-intensive, posing risks of labour exploitation, human rights abuses and poor working conditions.

One example of a key risk is deforestation linked to the livestock and animal feed industry. It is reported that livestock grazing could be responsible for around 40% of global deforestation. As a by-product of the meat industry, some of this can be attributed to leather. This growing global concern emphasises the need for increased traceability to farm level to become the norm for a company to be able to establish whether it is



sourcing responsibly. It is likely that legislation such as the EUDR will act as a driver for this change and it is likely that suppliers will become more accustomed to providing higher levels of traceability than has previously been required by businesses.

Supply chain mapping

Supply chain mapping is the process of gathering supplier information at all levels within a value chain to create a global map of a supply chain network, visually demonstrating all connections in a supply chain, so the origin and flow of goods can be visualised from beginning to end. For the footwear industry this would include all companies, suppliers, traders and subcontractors involved in a supply chain for each material and component used within a shoe. The goal is to provide complete visibility and the information generated used as a basis for due diligence to enable targeted action against any challenges that may have been identified.

Eurofins BLC Risk-Mapped Supply Chain service has been designed to provide visibility over a supply chain by working directly with a brand or retailer and its suppliers through the release of cascading questionnaires to identify where raw materials originate and which actors are involved in the complete supply chain. All data captured is validated by material experts to ensure the flow of supply is accurate and directly work with the supply chain, brand or retailer to solve any discrepancies, ensuring a high level of data accuracy.

The tool is designed for brands and retailers who may have limited knowledge of their value chains, and for those with greater knowledge who may wish to investigate specific concerns using more advanced technology and data assessments. Using software containing Geographic Information Systems (GIS), Eurofins BLC can highlight issues by geolocations, perform analysis and use satellite imagery where relevant to risk-assess relevant sustainability concerns. Moreover, such risks can be layered onto an identified supply chain, often in the form of heat maps where specific suppliers may be flagged as potential risk or

confirmed as low risk. The maps are navigable allowing pan and zoom functions, which allows businesses to also conduct their own in-depth assessments.

Typically, the further upstream of a supply chain the less engagement and information is provided by suppliers. However, risk level can still be estimated based on various factors including location using satellite imagery and environmental performance by country based on local laws and legislation. An example of this would be cases within the leather supply chain where traceability has provided visibility upstream to slaughterhouse but not to farming locations of which there can often be many. Likely sourcing regions can then be assessed in order to establish level of risk.

In South America, for example, studies have shown that animals are not typically transported for periods longer than three to five hours from farm to slaughterhouse. This allows a 'drive-time' surrounding a slaughterhouse to be calculated and risk-assessed against various environmental issues including deforestation where it is possible to spatially analyse rates of deforestation in local municipalities to establish whether suppliers may be contributing to such issues. In a similar manner, traceability and associated sustainability risks can be mapped for many materials, components and a wide variety of ESG concerns such as greenhouse gas emissions (GHG).

Traceability challenges

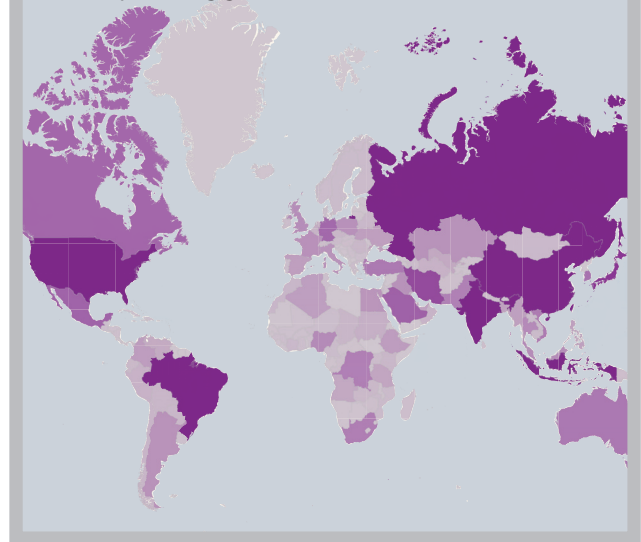
It is important to note that although the aim of supply chain mapping is to achieve complete visibility of a supply chain, the information gained is dependent on the transparency and engagement of supply chain actors. There is no simple answer to traceability, but supply chain mapping is a promising starting point of due diligence for brands and retailers which allows for further investigation and action based on findings once the supply chain and its risks are better understood. Where suppliers have not engaged with the mapping project but have been identified within a supply chain, their identification enables direct contact to be made which can enable greater traceability.

Some suppliers can be more transparent than others which is where a supply chain demonstrates a varied spread of risk. In instances where suppliers choose not to engage or omit information, the challenges to the brand or retailer will remain unknown, becoming more challenging to manage and presenting a higher risk. In these cases, non-engaged suppliers are flagged as priority for follow-up as a result of the traceability exercise to understand the reasons behind lack of engagement and to request further information regarding sourcing and business operations.

How is the output used?

The output of a supply chain mapping exercise is not intended to be static. It enables companies to conduct further investigation of their supply chain where risks may have been identified and allows for sustainability commitments to be made. It is always recommended that a business becomes familiar with its supply chain,

Heat map showing global GHG emissions in 2021.



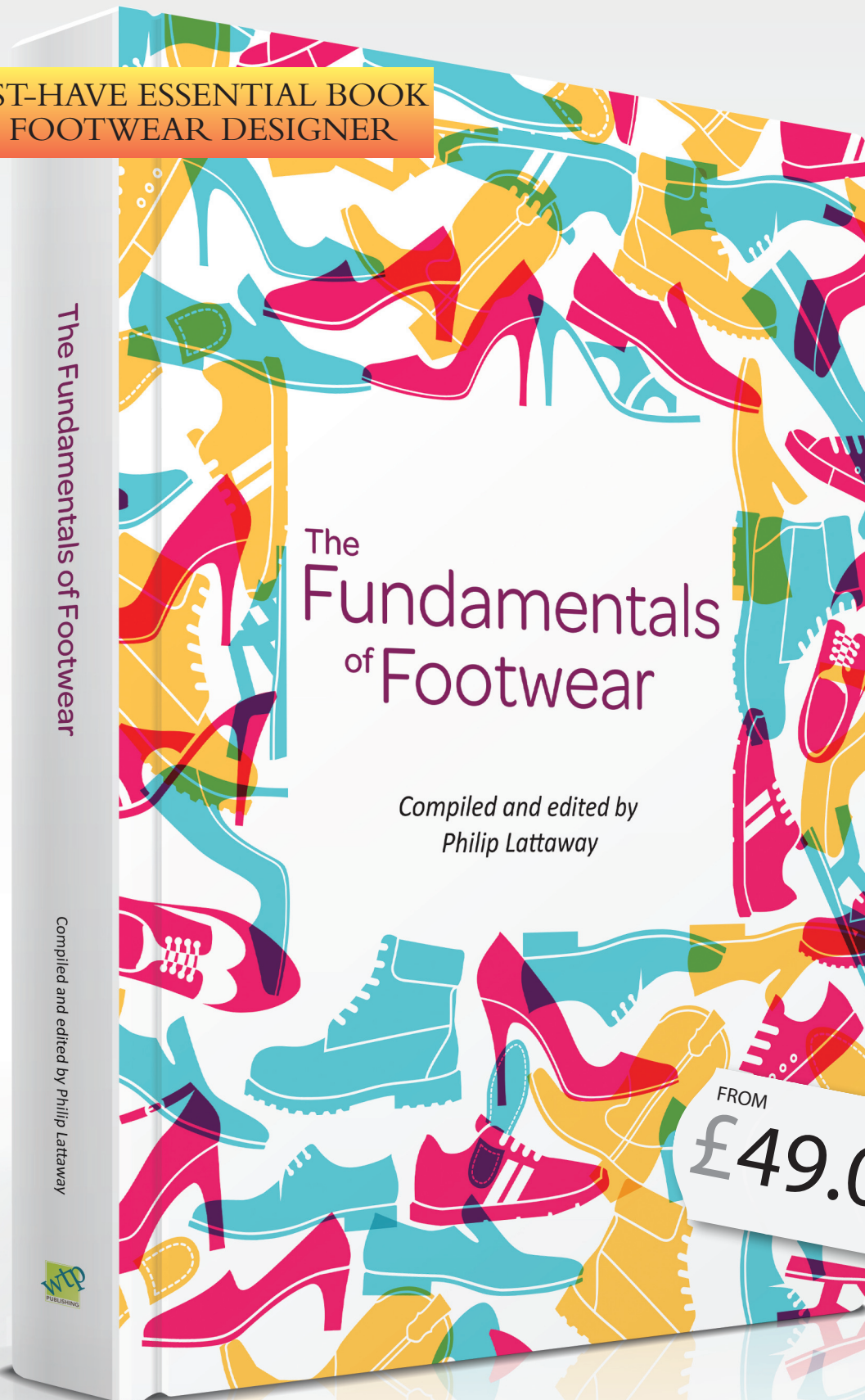
understanding which actors have provided good traceability and which have not. It is also important that a balanced view of volumes supplied by each supplier, the scale of identified challenges and level of visibility provided should be considered when prioritising due diligence decisions.

Output can also be used to build stronger relationships with consumers and influence their purchasing decisions. As consumers become more demanding to ensure their purchases are not contributing to environmental or social concerns, transparency and publicly sharing aspects of such traceability exercises can earn their trust and loyalty. This would help to create and support a more sustainable leather industry to the benefit of both the people involved and the planet.

Understanding the environmental and social impact within a supply chain from raw material sourcing through to finished goods is critical for the footwear industry to be able to make meaningful and impactful sustainability improvements and commitments. Many companies lack traceability upstream of their supply chains, of which risk exposure remains unknown. Although new and upcoming legislation is the main driver requiring larger businesses to gain greater traceability and commit to sustainability improvements, there are various benefits for businesses themselves beyond simply complying with such legislation.

Traceability solutions have been developed over many years with the aim of tracing supply chains back to raw material sourcing and the more recent development of supply chain mapping can bring visibility of the complete flow of goods as well as provide in-depth risk assessments surrounding sustainability concerns. The output of such exercises serves a dual purpose, not only for establishing and fulfilling sustainability commitments mandated by legislation but also for public disclosure. Consumers and stakeholders who are increasingly interested in understanding the manufacturing and sourcing of goods, seek assurance that they support environmentally sustainable and socially responsible brands. Sharing these aspects publicly aligns with this growing demand for transparency. ■

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CREDIT: SHUTTERSTOCK / JAN FAUKNER

How last shape can influence fit

Do you often think about your feet during the day? If the answer is 'yes', your shoes probably do not fit properly. The fact that you do think about them probably also means you are experiencing discomfort which is undesirable. Forcing your feet further back in your shoes because your bunions are sore, taking them off to give yourself a quick rub over the arch or developing calluses or blisters are all symptoms of poorly fitting footwear.

The problem is not limited to demographic groups based on race or geographic location alone. Nor is it necessarily the fault of fashion. It is actually quite simple and, while the solutions are more complex, they nonetheless exist and can be implemented more easily than one might think. The two most prevalent and widespread causes are the shapes and sizes of the lasts footwear is made on. The quest for universally well-fitting footwear is of course the ultimate aim, but it can never happen with 100% success.

To begin with, the foot changes shape and size during the course of the day. Depending on a person's bodily makeup, daily routine, climatic and other factors,

feet can expand in girth up to two sizes during that period. So, regardless of how pliable the shoe is or how closely the last matches the foot in question, it is totally unrealistic to expect a relatively static object like a shoe to keep up with the dynamics of the human foot from early morning to last thing at night. Then there is the wide variety of foot shapes that exist in the world, let alone the fact that no individual has two feet that are identical in shape and size. Anyone marketing footwear globally has to cope with variations such as a wide forefoot, a narrow heel, a high instep, low arches, high arches as well as other anatomical anomalies.

There was a time when we thought we could associate shape demographics with geographical regions. However, increased inter-racial marriage and continental population shifts have drastically weakened any theories that certain regions of a country or the world have people with a specific foot shape. The last bastions of this ideology are probably Asia or Africa, where feet are certainly proportionally wider than in those areas that have traditionally been more widely industrialised.



Typical modern last.

Classic Western boot last.

Western boot lasts

As individual feet change in shape and size, so there are huge variances in any given market. However, the problem with fit starts well before these factors come into play. With very rare exceptions, today's last shapes are geared more towards efficient production than even a generic attempt at good fit. Basic measurements may be within 'industry standards' but what about shape? There was a time in the mass production of shoes when lasts were shaped more like the typical human foot. However, in an effort to simplify pattern engineering and increase manufacturing productivity, lasts have adopted the nearly symmetrical shapes we see today.

Evidence of the benefits of properly shaped lasts does still exist, even in today's mass production. Western boots, for example, are a fashion item that comes and goes but never entirely disappears. However, many mass market styles are made on lasts that traditional boot makers would never use and the resulting poor fit means they are soon discarded as too uncomfortable. Anyone who has ever worn a true Western boot that has been properly made on a classic last knows it can be the most comfortable and supportive footwear you will ever wear. The reason is simple...the last shape.

Classic Western boot lasts are not shaped to facilitate pattern engineering or to speed up production. To begin with the forefoot curves towards the medial (inside) side more than does a typical shoe last. The cone also slants to this side as it runs forward from the instep to the ball and the bottom radius is usually slightly off centre, again towards the medial side. Backparts are much more sculptured than even some ladies pump lasts, heel

widths are narrower and measurements are much tighter in the ball and vamp area.

All this is designed to make the boot fit the foot and prevent it sliding forward or the heel slipping. The short heel measurement is properly proportioned to the rest of the foot so that when the boot is pulled on, the foot almost 'pops' into it. This sometimes requires a boot puller to make it easier to exit the boot but that is a minor inconvenience when you have had them on all day and never thought about your feet because they didn't hurt. This is the way all footwear should feel.

Getting into the swing

No one would ever suggest that last shapes should be available in the mass market to fit every person precisely. That is simply not feasible except in custom made to measure footwear. Even then, there remains the challenge of the foot swelling during the course of the day. However, a handful of last categories that addressed the main foot types would go a long way towards eliminating many of the more common problems people face when trying to purchase shoes off the shelf.

Lasts with narrow heels, high and low arches and high insteps would help, but perhaps the most important factor is the alignment or 'swing' of the foot. Stand up and look down at your feet without shoes on. Some people may actually see very little medial slant to the upper bones of the feet and the pronation of their feet might be so slight as to make the foot appear to be straight or, in rare cases, even supinated towards the outside. But these cases would not be the norm. A typical foot will indeed have the look and alignment of



Claimed by many to be the best fitting last ever made, the Munson last was developed for the US Military in 1917.

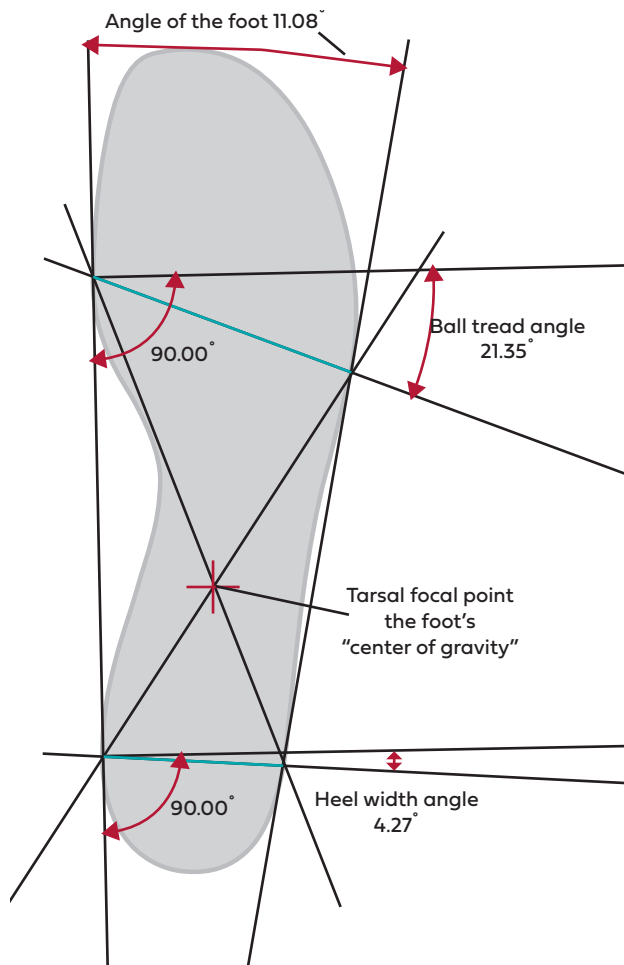


Figure 1: Last bottom layout using the William a. Rossi method (1941).

a classic Western boot last. (*Supination means that when walking, body weight tends to be on the outside of the foot. Pronation means it tends to be on the inside.*)

A different approach

So, what could be done to make a given shoe fit as many people in as many countries as possible and, using different grading systems? Today's computer technology is capable of offering consumers a much wider choice when purchasing footwear. However, rather than simply offering many sizes and numerous widths, as has been the traditional approach, it might be better to limit those parameters and instead go for foot types.

The dark perimeter line in Figure 1, is the feather edge of the last and the two straight blue ones show ball tread and heel width. By grouping lasts according to key points such as foot angle, ball tread angle, heel width angle and the location of the centre of gravity, greater success in terms of fit can be achieved. Simply grading a range of sizes and widths often fails to take into account the bone structure or biometrics of the foot. The value of producing only two or three widths within the same basic size ranges but with options of narrow heels and several different degrees of pronation could substantially increase the number of potential

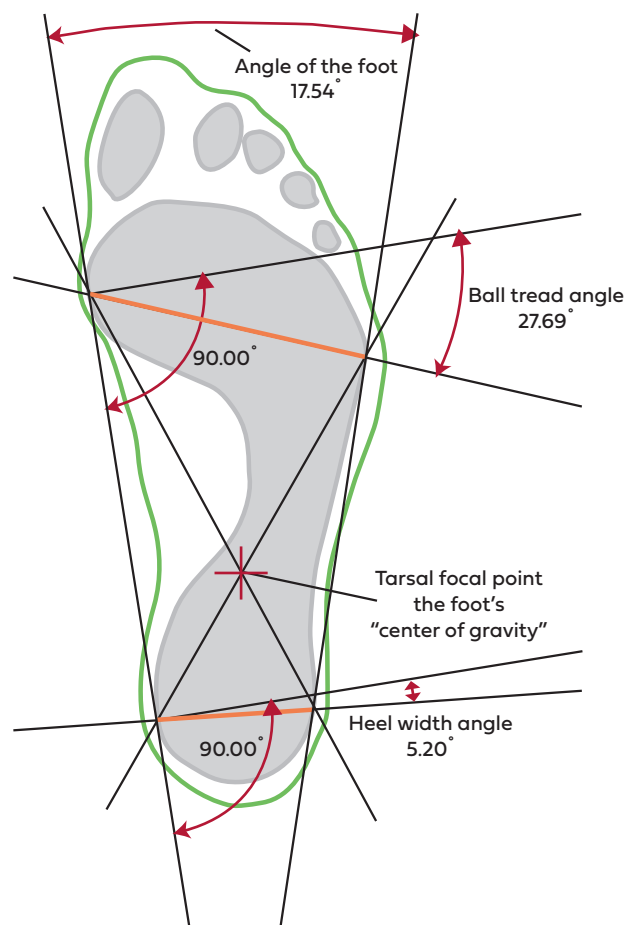


Figure 2: Developing the Rossi method.

customers able to buy shoes that were a good fit.

The same layout as shown in Figure 1 can be applied to foot groups based on a range of angles and centre of gravity locations. Four of five foot groups in these categories would provide a much more logical basis for fit than merely making shoes wider or narrower while still trying to force the foot into a shape that is not suitable. In Figure 2, the dark grey perimeter lines indicate the actual bottom surface of the foot (including toes) where it would touch the floor in a standing, barefoot position. Ball tread and heel width are shown as before but in orange. The green line is the widest volume point of the top of the foot and would correspond to the upper of the last at its widest point.

For instance, a base last shape could have several alternate shapes that could be quickly created and the process of converting the existing shoe style to the new last shapes would be but a fraction of the original design and pattern engineering process. True, there would be additional inventory of pieces and, depending on the manufacturing process, perhaps dies and some moulds. However, the effort and expense would result in far happier customers with far happier feet. ■

* This feature is based on an article by Bill Tippit Snr. that appeared in an earlier issue of World Footwear.



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Biomaterials for footwear

Maria José Ferreira, CTCP/BioShoes4All Consortium, Portugal

The bioeconomy covers all sectors and systems that rely on biological resources such as animals, plants, derived biomass and organic waste. It also includes economic and industrial sectors that use biological resources and processes to produce bio-based products. A bio-based footwear economy using renewable biological resources sustainably to produce biomaterials will help the industry reduce dependence on non-renewable and unsustainable resources and accelerate progress towards a circular and low-carbon economy. It will also address global commitments associated with the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement by ensuring sustainable consumption and production patterns, combating climate change and its impacts.

In footwear, materials, components and waste are the highest contributors to total GHG emissions and research and innovation are core to pursuing 2030 targets. The sector needs to develop and deploy the 'next generation' of sustainable materials and processes, including biological and plant-based materials and man-made bio-based materials. Positive steps in this direction are being taken within BioShoes4All, a Portugal PRR, (Recovery and Resilience Plan) Integrated project.

The project comprises 50 companies covering the whole footwear value chain including leather, polymers, soles, software, production equipment, leather goods, footwear and retail representation and leadership, plus 20 R&D bodies with complementary capabilities. It is coordinated by the author and is divided into five parts: Biomaterials, Ecological Footwear, Circular Economy, Advanced Production Technologies, Training and Promotion, and it is developing new leathers, bio-based materials, recycled materials, traceability tools, production systems, footwear concepts and business models.



Light Leather

Chromium (III) tanning has been questioned due to the possibility of oxidising to chrome (VI). In response to this concern, a great deal of research has been carried out in recent years. This has led to the development of chromium-free processes based on the use of glutaraldehyde, aided by metals such as aluminum or synthetic tannins. This has made it possible to produce wet-white leather with shrinkage temperatures of about 80°C. However, obtaining very soft and light leather from the current wet-white is a limitation. To compensate for the lack of filling capability of the aldehydes, resins and vegetable extracts along with additions of fats are necessary. This leads to soft albeit denser leather.

Project partners Dias Ruivo (leather manufacturer) and (R&D) teams from ISEP and CTIC work together to study the enzymatic modification of leather's internal structure. They experimented with alternative tanning agents, as glutaraldehyde has recently come under scrutiny under its potential toxicity. The aim was to develop processes to produce a soft and wet-white leather with lower density. Final tests indicated a metal-free tanning alternative, with a shrinkage temperature of around 80°C. Leathers using this method can take different finishes such as aniline, in any colour and in various thicknesses with good physical resistance that is considered adequate for use in shoes and boots (*Table 1*).

Wet-white bisphenol 'free' leather

Bisphenols have become an important topic of discussion as regards leather and footwear, especially since the European Chemicals Agency's proposed restriction on them. This will have an impact on the leather manufacturing process, which is why it has become imperative to deepen our knowledge of them. Bisphenols are a family of very similar synthetic organic chemicals with two hydroxyphenyl functional groups that allow polymerisation reactions to form larger molecules. Each type is

Table 1 – Eco Light Leather indicative physico-mechanical properties

Parameter	Result
Shrinkage temperature (°C)	80
Thickness (mm)	1.8
Tear strength (N)	180
Leather "grain" strength - elongation (mm)	9
Leather "grain" load resistance (N)	435
Apparent density (kg/m ³)	650

Table 2 – New wet-white leathers bisphenol 'free' indicative properties

Parameter	Base	New 1	New 2
Bisphenol F(mg/kg)	NO	58	40
Bisphenol S(mg/kg)	>10000	69	16
Shrinkage temperature (°C)	85	72	72
Leather "grain" strength - elongation (mm)	8.3	13.2	14.6
Leather "grain" load resistance (N)	165	328	446
Tear strength (N)	61	91	54
Elongation at break (%)	53	67	68
Tensile strength (N/mm ²)	19.3	37	18.6
BQL – Bellow quantification limit			

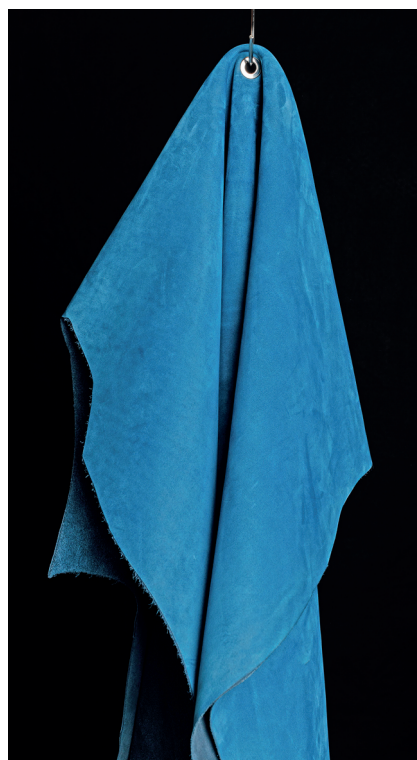
identified by a CAS number, including Bisphenol-A (CAS 80-05-7), Bisphenol-B (CAS 77-40-7), Bisphenol-F (CAS 620-92-8) and Bisphenol-S (CAS 80-09-1).

To our knowledge, none of these bisphenols are used directly as raw materials in leather manufacturing processes. However, Bisphenol-F and Bisphenol-S can potentially be found

in some condensed chemical products as unwanted by products of secondary reactions of their production processes. In the leather industry, these condensed chemicals, or syntans, are mainly used in pre-tanning and retanning processes to enhance important leather characteristics such as softness, tear resistance or whitening effect. For these reasons, replacing them while maintaining the leather's performance represents a challenge. This challenge inspired the project R&D team, led by Indutan, a sheep and goat leather manufacturer, to develop durable and functional leathers with bisphenol levels below 500ppm (parts per million).

Exhaustive work to carefully test, review and develop new leather processing recipes, resulted in new leather products in the high added values range with low bisphenol F and bisphenol S values, which fulfil the required specifications. Two examples of the new leathers' properties are shown in *Table 2*.

From the results obtained, it can be concluded that the new wet-white tanning process resulted in functional and durable leathers with both bisphenol S and F levels well below 500ppm. In addition, in terms of general properties, the leathers developed are very similar to those



Wet-white nubuck leather from Aveneda.

previously produced by the company and considered to be the standard, with a very pleasant feel, degree of filling and are ready to be produced on a large scale.

New retanning and filling agents

Leather production gives added value to a byproduct of the human food industry. This renewable biomaterial behaves in footwear like a ‘second skin’ that presents excellent physical, durability and comfort properties. Its production involves the use of water and chemicals, and teams from the project together with CTCF are studying ways to recycle these ingredients and production wastes, and estimate the new product’s reduced life cycle impact. Chemical products producer Aquitex, leather manufacturer Aveneda and the R&D partners, have been engaged in the possible value of bovine hair and tanned waste generated during the wet-white tanning process in developing biochemicals and leathers.

The process they have developed involves alkaline treatment/ hydrolysis of the waste to obtain a concentrated protein hydrolysate, followed by treatment with chemical agents to produce bio chemicals and products with around 40% solids content. These bioproducts’ retanning and filling properties produce wet-white leathers such as aniline or nubucks with good surface appearance, softness, degree of filling and physical properties.

Origin Peel bio-based coated textiles

The sustainability of materials has achieved unprecedented importance, particularly in the search for biobased approaches which favour raw materials of biological origin and thus offer alternatives with a lower carbon footprint. However, in coated textiles many products on offer are still made from raw materials of fossil origin. It is now possible to synthesise polyurethanes partly from raw materials of plant origin such as vegetable oils modified into polyols, which are then polymerised with reagents of fossil origin known as BioTPU. These can therefore be considered a more sustainable

Table 3 – ORIGIN physical and mechanical properties			
Parameter	Fashion Footwear		Result
Tensile Strength (N/mm)	Warp (T)	> 10	11.3
	Weft (TR)	> 5	6.6
Elongation at break (%)	Warp (T)	> 50	62.7
	Weft (TR)	> 100	115.6
Tear strength (N)	Warp (T)	> 25	29.4
	Weft (TR)	> 20	26.2
Adhesion to the coating (N/5cm)	Warp (T)	> 1	1.19
	Weft (TR)	> 1	1.32

alternative to fossil-based polymer coatings. A complementary approach to increasing the proportion of bio-based content is to incorporate bio-charges and fibres into the coating and reduce the fossil-based content.

Portugal is one of the largest producers of olive oil and the actual olive stone represents an abundant biomass estimated to be 60,000 tonnes per year and currently without any other use other than burning to create energy. This has contributed to it being chosen by Monteiro Fabrics as a bio-waste to be incorporated into biocoating formulations. The ORIGIN material created by the company within the BioShoes4All project is the result of the development of a BioTPU and water-based formulation containing olive stones applied to a cotton fibre

textile base. The company says that the physical and mechanical characteristics shown in *Table 3* fulfil the specifications for shoe uppers. It also has a proven 72% bio-based carbon content in accordance with ASTM D6866.

Chestnuts are traditionally used for human and animal consumption given their nutritional properties and Portugal is, again, a major producer. Processing generates various by-products, such as shells, flowers, leaves and wood. Monteiro Ribas, together with local partners, collects these biomaterials. They are crushed and ground into a fine powder which is then turned into an innovative product. Faced with the challenge of developing planet-friendly solutions, the company has created its Peel collection incorporating 60% plant-based materials including chestnut waste, organic cotton and natural oils. By making these solutions available in an attractive and easy way, it reinforces its commitment to best environmental practices.

The material is offered in a range of eight colours, allowing customers to create innovative products without having to choose between cost, performance, aesthetics or sustainability.

It is a technologically viable product, ready to be produced on a large scale and without compromising its performance. Technical requirements for use in cemented footwear are all met including high Bally flex resistance (150000 cycles), Martindale abrasion (400000 cycles), resistance to friction (Crockmeter), sweat, light fastness among others. Peel’s 65% bio-based carbon content has been verified in accordance with ASTM D6866. ■



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Performance provides the buzz

Innovations in the Adizero Adios Pro Evo 1 include a forefoot rocker to trigger forward momentum.

CREDIT: ADIDAS

Sports shoe brands' seriousness about sustainability is impossible to deny. Many of them have announced ambitious targets for tackling climate change and publish annual sustainability reports to track progress.

Japanese brand ASICS has published a pledge to reduce carbon emissions from its direct operations and from its supply chain by 63% by 2030, taking the figures for 2015 as the baseline. The company also has the target of achieving net-zero carbon emissions by 2050. Puma has set itself a target of a 35% reduction in "absolute emissions" (the total amount emitted) from its own entities between 2017 and 2030, and a 60% relative emission reduction (emissions relative to specific activities) for its supply chain between 2017 and 2030.

At New Balance, the aim is to reduce scope-one and scope-two emissions by 60% by 2030, with figures for 2019 as the starting point. Scope one refers to direct emissions from the company's own facilities, while scope two means indirect emissions from the energy the company consumes. For scope three, which includes emissions from suppliers, the target is a reduction of 50% by 2030.

Nike's figures are more graphic. It has calculated that it has the same climate impact as a major city. If it includes the people who work in its supplier factories,

Changes to materials and construction are crucial in creating shoes that will provide athletes with performance gains. What this means for sustainability strategies is a separate question.

more than a million people are involved in making Nike shoes and other products. The company said its emissions at the start of this decade were 11.7 million tonnes of carbon dioxide equivalent (CO₂e) per year. According to academic modelling platform the Global Gridded Model of Carbon Footprint, these figures would rank Nike in a similar bracket to Munich, Prague or Amsterdam. Its aim is to reduce, by 2030, its scope-one and scope-two emissions by 65%, its scope-three emissions by 30%, and to reach net zero by 2050.

Compared to 2017 figures, adidas has a target of reducing the emissions for each of its products by 15% by 2025. By 2030, its aim is to have reduced absolute emissions across its entire value chain by 30%. It, too, targets becoming climate-neutral by 2050.

“These are the lightest racing shoes I have ever worn; running in them is an incredible experience,”

TIGIST ASSEFA, WORLD RECORD-HOLDER

Prototypes of the Adizero Adios Pro Evo 1, the shoe that helped Tigist Assefa break the women's world record for the marathon in Berlin in 2023.

CREDIT: ADIDAS



Where the buzz is

All of this is good work and the pride these companies have in their progress so far comes across clearly in press releases and other communications. Even so, it is hard to miss that the biggest buzz of all for brands still seems to be related to performance. If the gains that athletes make in speed, height or distance owe anything to their shoes, the footwear brands concerned are certain to celebrate loudly. This is especially true in the build-up to an Olympic Games.

The global director of athlete services at adidas, Fabian Schweizer, has said that while professional athletes are looking closely at advances in biometric monitoring and in nutrition to help them improve their performance, good footwear remains critical to their success.

Writing on social media platform LinkedIn at the start of this Olympic year, Fabian Schweizer picked out his three top innovation trends in sports performance for 2024. He said that biometric monitoring to inform personalised training programmes was certainly one of them. He explained that targeted training programmes, based on data from wearable technology and sensors, were becoming increasingly important to athletes and coaches.

In a similar way, he said personalised nutrition and the field of nutrigenomics, which studies the interaction between nutrition and a person's genetic profile, are also becoming increasingly important for professional athletes. An increase in available data is allowing sports people to address accurately their own specific nutritional needs.

If these first two trends are concepts that most athletes of previous generations barely thought about, the third trend that Fabian Schweizer has identified is as old as sporting competition itself. He said that footwear remains a critical component in professional sport. In terms of performance enhancement, he said the most important innovations are aimed at delivering customisation, energy return, and biomechanical optimisation.

Forefoot rocker

Last year's big headline-grabbers in athletics included Ethiopia's Tigist Assefa, who broke the world record for women for the marathon in Berlin in September with a time of 2:11:53. In her post-race reaction, the athlete held up one of the shoes she wore, an Adizero Adios Pro Evo 1, as though to pay tribute to its contribution.

Speaking at the launch of the shoe earlier the same month, Ms Assefa said: "These are the lightest racing shoes I have ever worn and the feeling of running in them is an incredible experience, like nothing I've felt before. They enable me to put my full focus on the race, which is exactly what you want as an athlete. I can't wait to lace up at the start-line in these."

Each Adizero Adios Pro Evo 1 shoe weighs 138 grammes, which is 40% lighter than any previous running shoe the brand has created. It incorporates a forefoot rocker component "to trigger forward momentum". The shoe also contains a new version of a proprietary foam material called Lightstrike Pro. A non-compression moulding process makes the foam lighter, while delivering greater energy return, adidas claims. New outsole technology, a mesh upper and the removal of the sock-lining are other weight-saving measures.

From triumph to tragedy

A month after Tigist Assefa's record-breaking performance in Berlin, Kenyan runner Kelvin Kiptum set a new world record for the men's marathon, clocking a time of 2:00:35 in Chicago. He was wearing a prototype pair of Nike Alphafly 3 running shoes for the event. His success sparked widespread speculation that here was an athlete who was on course to achieve a sub-two-hour time in race conditions and would do so soon, perhaps even on the greatest stage of all, at the Paris 2024 Olympics in August. Triumph turned to tragedy for Kelvin Kiptum at the start of this Olympic year, however, when he died in a road accident. He was 24.

Features in the Alphafly 3 include a high-stack proprietary foam called ZoomX for lightweight cushioning. It has a continuous bottom, connecting the heel and the forefoot. Nike says this suits varying foot-strike patterns and provides “a smoother heel-to-toe transition”, regardless of the runner’s pace. The shoe also contains a wider, full-length carbon fibre plate for “a propulsive, stable ride”.

The current Olympic men’s marathon champion, Eliud Kipchoge, also from Kenya, has already run the race’s distance, just over 42 kilometres, in less than two hours. He did so at a specially organised event in Vienna in 2019, at which he was the only competitor, with pace-setters moving in and out at certain stages to help drive him on. He, too, wore shoes from Nike at this event and achieved a time of 1:59:40. The official records only recognise times athletes achieve in official competitive events. Nike says Eliud Kipchoge has given input to the design of a number of running shoes down the years, including its Free, Pegasus, Vaporfly and now Alphafly ranges.

Dual trend

It is no coincidence that shoes for marathon runners receive particularly intense attention from the designers of performance shoes. Changes to the design of a shoe may only shave a tiny amount of time or effort off each step an athlete takes, but if an elite marathon runner takes 150 or 160 steps per minute, it can make a real difference over the course of a race. This is always at the forefront of the efforts of shoe designers who work at this level.

Performance gains are not their only objective, because comfort and injury prevention are also important, but a cursory glance and a brief feel of an old shoe should be enough to show how much thinner and lighter today’s footwear is. On the face of it, the enthusiasm footwear performance advances generate could be at odds with companies’ commitments to sustainability, not least because it is entirely possible that elite athletes will wear each pair only once before throwing them away. Fabian Schweizer has argued that innovative materials, including recycled and bio-based options, are gaining traction as athletes and manufacturers alike recognise the importance of reducing environmental impact. He says the industry is now witnessing “a dual trend of sustainability and high-end performance enhancement”, as though the two can go hand in hand.

Strike a balance

A senior executive specialising in sustainability at New Balance, Katy O’Brien, says performance and sustainability can work together. She says the company she works for remains committed to creating premium, performance-driven shoes. She believes the buzz that advances in footwear performance can create is a good thing for brands and for the industry in general, but

she insists that it is possible to strike a balance between performance improvements and brands’ battle to reduce waste and lower the environmental footprint of their products.

In contrast to the short lifespan of what she refers to as “the supershoes” that elite athletes race in, she says keeping and wearing footwear for a long time is an increasingly important part of this battle. In the course of her 20 years as a running enthusiast, she has absorbed the received wisdom that if you start to feel some pain in the knees, it is time to change your shoes, or that if you have already run a lifespan total of around 500 kilometres in the same footwear, it is time for a new pair. Now, however, she believes many runners are pushing beyond the pain and the previously accepted distance limits in a bid to make the useful life of a pair of shoes longer and in doing so make their carbon footprint smaller.

She has worn some of the supershoes and understands why athletes and designers are so captivated by the benefits they offer. Her assessment of them from a sustainability point of view is that the foams, carbon-plates and other materials in their construction make it difficult to recover much of their value at the end of their short life. “But it is a very small proportion, perhaps 1%, of all footwear,” Ms O’Brien insists.

If these elite shoes last for, at most, a marathon or two, the athletes who wear them can try to make sure their other footwear, the shoes they wear when not competing, are longer-lasting. Another benefit Katy O’Brien identifies is that the desire to emulate, if not replicate, progress in performance in more mainstream shoes is leading to changes that will provide a sustainability bonus. She mentions some of the reductions in material use that deliver the all-important weight-savings at the front end and says they can also improve the recyclability of the product.

“There is so much we can do to reduce waste,” she explains, “and the time has certainly come for us to stop talking about what might be possible and to start making meaningful change at scale.” Returning to New Balance’s target of achieving a 50% reduction in its scope-three emissions by 2030, Ms O’Brien has calculated that if the company could eliminate material waste, this would take care of 12% of the total, almost a quarter of the way to the goal. ■



Record-breaker. Nike's Alphafly 3. The numbers on the outsole indicate how much athlete testing these shoes have undergone.

CREDIT: NIKE



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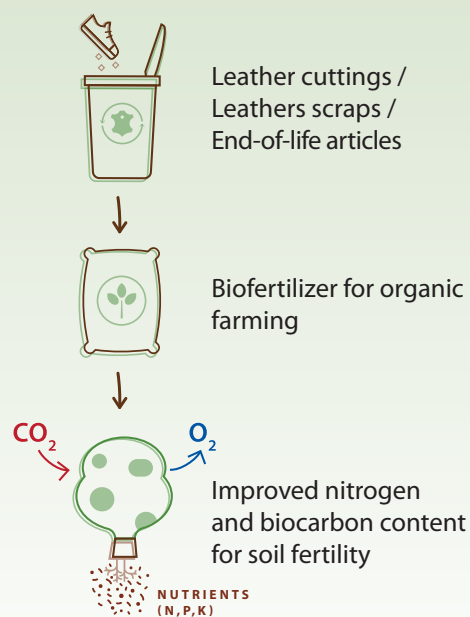
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Patagonia says the Wild Idea Boots are "built for a lifetime of hard work". The outsoles are 30% recycled Vibram EcoStep and they include removable recycled cork insoles.

CREDIT: PATAGONIA

No herd mentality

It is estimated that as little as 200 years ago, millions of bison, also known as the American buffalo, roamed freely over the vast grasslands of the US. It took less than a quarter of that time to slash that to mere hundreds, according to the US Department of the Interior. The keystone species in that environment was decimated by settlers, hungry for the food and leather, and with little regard for or knowledge of how the ecosystem would be affected. Had it not been for a few private individuals working with tribes and the Department of the Interior, the bison would be extinct.

For Dan O'Brien, reintroducing bison to the prairies in South Dakota was an afterthought. An author and conservationist, his priority was tracking the peregrine falcon and working to increase their population and reinvigorate their breeding and feeding grounds. But all natural ecosystems are delicately linked and he realised the ground had adapted to the roaming buffalo, with their hooves gently disturbing and aerating the soil, allowing the grasses to flourish and habitats to form.

Wild Idea Buffalo range was established in 1997, with an initial aim of revitalising 1,000 acres with a small herd of buffalo. This has now grown to over 300,000 acres, and the changes to the landscape are astonishing, says ranch manager Colton Jones. "What we are trying to do by reintroducing the bison to the

A conservation project in South Dakota has brought life back to the grasslands with the reintroduction of buffalo. With nothing going to waste, Patagonia is using the leather in its first work boot collection.

grasslands is to put the missing piece back. We see a change in biodiversity in the grass and bird species. We have seen a change in the wildlife. The flora and fauna have altered dramatically in less than 30 years."

At one with nature

Part of the philosophy of the company is to produce grass-fed and field-harvested meat, which means the animals are shot on the range in their natural habitat and are skinned in mobile abattoirs. The Wild Idea team believes this is the most humane way to harvest the animals: they are not subjected to the stress of transport or the feedlot or abattoir. This in turn produces better meat, they say: free from the cortisone or stress hormones that can flood the animal if they are in distress. "We try to treat them as close to nature's intentions as possible, give them respect in

life and dignity in death," says rancher Jilian Jones.

Outdoor clothing company Patagonia had been buying bison jerky from the company for several years when the two companies teamed up to look for a solution for the hides. "Not wasting any part of the animal is a key part of Wild Idea's philosophy," adds Ms Jones. "We started thinking about the idea of a boot."

Natural ruggedness

US-based tannery Horween specialises in the thicker leathers, including horsehide and bovine, and tanned the hides for Patagonia using wet-green technology, a vegetable tanning method that uses tannins from waste olive tree leaves. "Bison would seem to behave like a cow or steerhide, but it's quite different," comments Nick Horween on the tannery's website. "The bison hides are much greasier and tend to have pockets of lightweight areas, especially over the natural hump of the animal's back. The hides also have more natural wrinkles and striations due to the ruggedness of the animal."

Patagonia contacted one of its footwear suppliers in Portugal, Hugal, a family run company that specialises in Goodyear welted construction and supplies the military and rural sectors, to see if they could work with the buffalo leather to construct a special work boot. The Boita family relished the challenge. "I like this product a lot, because we can feel the naturalness of the leather. It does not have any chemicals or plastics. It is very natural," says company founder José Boita, who has been making shoes since he was 14.

The boots have uppers built from the hardworking, long-lasting buffalo leather, which conforms to the foot without losing shape. Brass five-eye lace-ups and three speed hooks provide a secure fit with ankle support. The Goodyear welt is a specialist method of attaching the outsole to the upper, making it easy to replace outsoles and extend the life of the boot. In fact, the soles could be replaced many times over, the leather is so durable, say the makers. "This is a high-quality material that respects the environment," says Jose's son, Andre, managing director at Hugal. "We think that's the future. That's the big opportunity to start a new age."

“Putting the boots back in contact with the grass where they started, that's very powerful.”

DAN O'BRIEN, WILD IDEA BUFFALO

Grassland grazing

Dan O'Brien isn't just a supplier to Patagonia – he is a friend of founder Yvon Chouinard, after crossing paths through business many years ago. "You need to read this book," Mr Chouinard said to him on a recent Zoom call. The Ministry of the Future by best-selling author Kim Stanley Robinson is a fictional look at a government department battling to reverse climate change: although a somewhat depressing vision of a planet ravaged by global warming, there is hope. And in it, the author namechecks some visionary companies. Including Wild Idea Buffalo.

"The upshot is this: global climate change is very real," says Mr O'Brien. "It is happening and it's going to continue to happen. It's an existential threat and we are all going to suffer. But it is also an opportunity to hit the reset button on our relationship with Earth. We must never forget the provocative and transformative words of another man worth listening to: 'It is not the strongest of the species that survives, nor the most intelligent, it is the one most adaptable to change': Charles Darwin."

The number of Patagonia's bison leather boots will be limited each season, coinciding with the number of hides available as a result of Wild Idea's food production and conservation practices. These sturdy work boots provide protection and comfort for farmers, which deepens the connection to the ground they are sourced from, says Mr O'Brien. "The loss of the grasslands is a huge tragedy, but the work we're doing here is going to help. Symbolically, metaphorically, the boots are the foundation. That's how we get around. Putting the boots back in contact with the grass where they started, that's very powerful." ■



The American bison was named the national mammal of the US in 2016. They are the largest mammal in North America. Male bison (bulls) stand 6 feet tall, while females (cows) reach a height of 4-5 feet. They weigh on average between 700 - 2,200lbs.

CREDIT: UNSPLASH



Inspired choice. This Chelsea boot style was one of four to come out of Gore's AI-inspired safety footwear project.

ALL CREDITS: W.L.GORE & ASSOCIATES



AI becomes a serious tool

Materials innovation developer W.L. Gore & Associates has carried out a series of early investigations into the potential that may exist for using artificial intelligence (AI) in the design of workwear. An early example of the work the company has done so far is focused on safety footwear.

Already convinced that using AI in design offers "fascinating opportunities for inspiration", the company wanted to "test the limits" of using the technology in the design of safety footwear. It embarked on a project involving the Extraguard material for uppers for safety shoes and boots that it launched last year and said that the results of the experiment were that "amazing design inspiration" can be at the disposal of safety footwear brands and manufacturers if they embrace AI.

More than fantasy

Gore has gone on to look closely at wider workwear possibilities that AI technology can offer its partner brands. It describes the concepts that have come out of this so far as "visionary and more than pure fantasy".

W.L. Gore & Associates believes a recent project involving AI and its versatile Extraguard safety footwear upper material points the way to a huge range of design possibilities.

The visuals it has shared include a workwear jacket with an illuminated city map on the back as part of what the materials company has described as a Klimt-style aesthetic. It has also made a visualisation of a construction worker who is "as strong as Godzilla", with prosthetic claws designed into an otherwise familiar-looking outfit.

Daily challenges

"We always start with the end users," explains the company's business leader for workwear, Leonhard Schlichting. "Where do they work? What are their needs? What are their pain points? How can we

“We always start with the end users. Where do they work? What are their needs? What are their pain points? How can we improve comfort?”

LEONHARD SCHLICHTING, W.L. GORE

improve comfort?” He insists that Gore’s focus goes beyond textiles, tapes and laminates and that it is committed to understanding the daily challenges workers face. From there, it seeks to work with leading manufacturers of shoes and clothing to improve protection and comfort for wearers.

Extraguard’s contribution to this effort is that it offers lightweight characteristics that aid comfort over a long working day. Importantly, the material remains light even when wearers have to spend long periods of time in extreme weather conditions. Other properties the developer of the material points to are flame-retardant functionality and a lower environmental impact than footwear brands have been able to achieve with previous constructions.

Beyond this, the recent Extraguard and AI project also illustrated that the upper material is versatile enough to make a wide range of designs possible. AI makes it easy and quick to visualise new footwear designs, Mr Schlichting explains. He argues that, because it lends itself to a wide range of processing options, a larger number of these designs will be realisable with Extraguard than with other footwear materials.

From keywords to styles

A starting point for the project was to use a selection of terms denoting different safety footwear styles as keywords. Gore then worked with a Los Angeles-based specialist technology partner, AI Alanis, to refine the ideas that emerged into four Extraguard categories: Chelsea boots, rigger boots, athletic safety shoes and rubber boots. These initial design ideas have stimulated a high level of interest from customers, Gore states, and it hopes now to enter into more in-depth discussions with safety shoe manufacturers and brands about the possibilities that lie ahead.

In the recent past, it would have been necessary to show interested customers inspiration boards, images and prototypes to put the concepts across in full. AI is making all of this faster and more realistic. The technology has evolved from being a sophisticated and expensive toy and has now become what Gore has called “a serious tool”.

Its conclusion is that it can provide footwear brands with important help in making the transition from producing safety shoes and boots that workers will wear because they have to. Now, instead, they could find it much easier to create products that workers will wear also because they are attractive and desirable. ■



Designs for rubber and athletic style safety boots that emerged from the project. AI makes the process of presenting a concept faster and easier.



ECHA's headquarters
in Helsinki.
ALL CREDITS: ECHA

Swot analysis

Out of the approximately 2,400 mainly consumer-facing products inspected by the national enforcement authorities of 26 European Union (EU) member states between January and December 2022, about 435 were found to be in violation of EU chemical laws. This figure constituted 18% of the total sample, according to the European Chemicals Agency (ECHA), whose Forum for Exchange of Information on Enforcement (ECHA Forum) organised the study and published its results at the end of last year. The network holds enforcement responsibility for the following regulations in the EU, Norway, Iceland and Liechtenstein: REACH (registration, evaluation, authorisation and restriction of chemicals), CLP (classification, labelling and packaging of substances and mixtures), PIC (prior informed consent) and POP (persistent organic pollutant), in addition to the biocidal products regulation (BPR).

REACH-en-Force-10 (REF-10), the name of the coordinated research project, now in its tenth edition, was initiated in 2010. REF-10 tested 423 mixtures and 1,984 articles in total. Regarding footwear, the enforcement authorities in each of the 26 participating countries not only focused on substances discovered in shoes, interrogating each

A report by the European Chemicals Agency discovered that 8% of footwear failed to comply with single-market chemical regulations in 2022.

finished product in line with REACH restrictions, but also on duties applicable to articles under both REACH and POP restrictions. A breach was logged when hazardous chemicals were proven to be present in consumer goods to excessive levels.

Indicative results

Categories that underwent inspection ranged from fashion, shoes and accessories to sporting equipment, electronics and children's toys. Across the board, the non-compliance rate for articles was 20%, according to Helsinki-based ECHA, whereas non-compliant mixtures took a smaller share, representing 9%. For the most part, non-compliant articles are typically withdrawn from the market. Broadly, 15% of fashion products, footwear included, were deemed non-

compliant due to inspectors' detection of harmful concentrations of lead, chromium, cadmium, phthalate and perfluorochemical and short-chain chlorinated paraffin (SCCP) content, for example. The number of fashion articles checked was 895, out of which 136 were found to be non-compliant. Exactly half of all handbags tested were in breach of EU law. Meanwhile, the percentage of shoes which fell afoul of regulations fared better, standing at 8%.

ECHA's harmonised enforcement team leader, Maciej Baranski, tells *World Footwear* that the non-compliant shoes found during REF-10 were "most probably imported". Some will have originated from outside the European Economic Area (EEA), he says, while others' provenance is unknown, suggesting that they were also imported from elsewhere. No data was collected on the origin of individual ingredients. Around 50% of all footwear inspected was manufactured in the EEA, Mr Baranski explains. Although the number of shoes tested, 74, was in reality "only a small fraction of all controls", the results are indicative, he goes on to say, "especially if we consider the millions of shoes that are placed on the EU market every year". Substances hazardous to human health and the environment alike that were present in enforcers' footwear samples beyond accepted levels included phthalates, chromium, SCCPs and cadmium. These chemicals were variously found in materials such as leather, rubber and synthetics, as well as in metal footwear components and accessories.

Examples include a pair of Chinese-made, Kappa-branded polyvinyl chloride (PVC) slide sandals, rejected at an EU border for their excessive bis(2-ethylhexyl) phthalate or DEHP content, per REACH regulations. DEHP-plasticised PVC was flagged by the EU's publicly accessible Safety Gate product-alert system as posing a health risk for human reproductive systems during childhood. Another product, leather baby shoes from Turkey, was destroyed due to, potentially carcinogenic, high chromium levels (up to 13 ppm). The footwear was non-REACH-compliant and national authorities ordered that the importer cease all sales. A pair of leather children's shoes by the Magnus brand, again manufactured in China, were flagged by border enforcers as similarly non-compliant with REACH restrictions on account of their containing 5.6 ppm of chromium per kilogram. Their distributor subsequently pulled them from the market and issued a product recall to its customers.

Controlled processes

ECHA Forum members are typically engaged in several ongoing chemical safety and compliance-related enforcement projects every year. Investigations into imports, cosmetics, e-commerce, biocides and "collecting results from inspections of safety data sheets" are all underway at present, Mr Baranski shares. REF's findings tend to be somewhat consistent each time, demonstrating little variation over the years, at least when it comes to importer and marketplace non-compliance percentages, but lessons are learned and the network reviews its methodologies to keep them up to



The chemicals agency's harmonised enforcement team leader, Maciej Baranski.

date, especially when revisiting past research topics. Among the recommendations it lists to industry, the EU and member states' national-level authorities at the end of the REF-10 report, ECHA emphasises the need for consumer goods companies to stay abreast of their legal duties, specifically when it comes to their materials and chemistry choices.

This would involve establishing and implementing specific supplier requirements, if they haven't already, the enforcement team lead says, in the interest of mitigating risk to human and environmental health. It is also important that supply partners have all necessary documentation to hand before placing finished articles on the market, he notes. ECHA encourages businesses to use EU-focused digital tools such as Safety Gate and ICSMS (information and communication system for market surveillance), to identify any non-compliant products ahead of time. Importers and distributors should be mindful of completing the required risk assessments before attempting to bring footwear, fashion and other products into the EU that have been produced outside the EEA.

As sustainability minded top-down guidance continues to require brands, retailers and their supply chains to adopt cleaner processes in the interest of 'greener' products, regulations are only set to increase. ECHA Forum only published its guidance on the enforceability of restrictions to per- and polyfluoroalkyl substances (PFAS) requested by German, Danish, Dutch, Norwegian and Swedish authorities late last year, for example. If anything could shake up the next round of REF data, further tightening single-market restrictions on PFAS-containing footwear and outdoor apparel imports should certainly do the trick. ■



Overview of PrimeAsia's
Vietnam tannery.
ALL CREDITS: PRIMEASIA

PrimeAsia looks towards a bright future

From its vantage point, PrimeAsia's leather manufacturing shows no sign of slowing, according to the tannery group, which is undergoing an expansion at its Vietnamese plant to boost capacity there from six million to eight million square-feet per month. The leather manufacturer, which also has operations in China and is headquartered in the US and Taiwan, has unveiled plans for a wide-ranging sustainability strategy called 'Sustaining Excellence, Preserving Tomorrow', which will help reduce its footprint and provide data that its clients can use in their own product or company calculations.

PrimeAsia's strategy is created and guided by the group's chief sustainability officer, Camille Mori, who joined at the start of 2023. The initiative will be based around four pillars: added to the current Operational Excellence will be Circularity, Climate Action and Social Impact. "Under Operational Excellence we are looking to continuously improve our management systems for compliance management, traceability, chemical management and resource management," Ms Mori tells *World Footwear*. "With Social Impact, we are continuing to give back to communities where we operate, will be tracking progress toward worker wellbeing programmes throughout our value chain, and will be disclosing wage data and tracking wages against the Global Living Wage Benchmark."

The leather manufacturer has set out an ambitious new strategy to give its clients access to verified data to weave into their own carbon reduction and sustainability targets.

Measurable impact

One of the key themes that underpins the strategy is that of producing and providing quantified data that can be used as benchmarks within the group and by its customers. PrimeAsia is partnering Spin360, a consultancy led by Federico Brugnoli that specialises in mapping carbon footprints in the leather supply chain. Their joint work includes collecting and analysing data for an expanded Lifecycle Assessment which includes more products and an increase of primary data, and conducting a carbon footprint analysis to develop carbon reduction targets to submit to the Science Based Targets Initiative (SBTi), an organisation that developed industry standards for companies to meet greenhouse gas reduction targets.

The aim is to have near-and longer-term targets approved by SBTi during 2025, plus align with Science

“Our customers are asking for data and evidence to show our progress, and we intend to offer this transparency.”

CAMILLE MORI, PRIMEASIA



Hides dry as they move around the facility in China.

Based Targets for Nature to set strategies for water, land use and biodiversity. “It is vital for us to follow industry standards for calculating and reporting on climate action so we are following the same protocols as our brand customers and supply chain partners who have also set SBTi targets,” explains Ms Mori. “This will help with disclosing carbon accounting data to our suppliers who are counting on us to reduce our emissions as part of their scope 3 [manufacturers’] targets.”

PrimeAsia specialises in footwear leathers, supplying to global shoe brands such as Nike and adidas. For these types of companies, offering transparency in their supply chains will become more important, potentially driven by incoming legislation in Europe that requires Digital Product Passports, with information on components and ingredients. These brands will lean on their suppliers to help them meet their own targets. “Our customers are asking for data and evidence to show our progress, and we intend to offer this transparency,” adds Ms Mori, who has experience of what the brands will need, having joined PrimeAsia from PVH Corp.

Circular advances

Circularity is a central tenet of the strategy, building on the truism that hides are a byproduct of the food industry. The group is also researching avenues for its leather waste and packaging within the tanneries and partner footwear factories. It has been increasing the volume of recycled water the tanneries use, hitting the 60% mark on average last year. The target is to use only recycled water for leather production in the tanneries by 2040 or earlier.

All of these sustainability improvements require time, investment and commitment. To make sure these commitments stay on track, PrimeAsia is recruiting more people to its sustainability team, to add to its rollcall of over 3,000 employees based across its manufacturing sites as well sales and marketing teams in India, Indonesia, Taiwan, Thailand, the UK and US.

Collaborating with supply chain partners and the wider sector will also be key to creating an industry-wide impact on the big issues, Ms Mori believes. “There is also a lot of momentum in groups like the Leather Working Group to drive industry approaches and solutions to big challenges like traceability, carbon reduction and biodiversity.”

Expansion plans

As part of the expansion of the facility in Ba Ria-Vung Tau province in southern Vietnam, new technology is being added to improve its energy, waste and water management, as well as a new retanning and colouring mezzanine and will also include eight new fully automated production drums. The current sample retanning and colouring area will be relocated to a newly constructed dedicated building. It is also updating the pigment finishing lines to support growing demand for athletic leathers, new drying and conditioning equipment, new equipment for splitting, shaving and buffing, and a significant upgrade to the wastewater treatment plant and solid waste handling technologies. To help meet its renewable energy targets, solar panels are being added to the roof. “While the stated focus is building capacity, the underlying mission is to make positive adjustments within the tannery, and leather making process, that will allow PrimeAsia to produce leather more efficiently and faster while maintaining high quality standards,” says PrimeAsia CEO Jonathan Clark.

An increase in demand for retro-looking athletic shoes has seen a multitude of leather and suede designs from footwear brands over recent years, and shows no sign of slowing. Leather’s credentials only feed into the growing desire to move away from plastic, too, adds Ms Mori. “From a sustainability perspective, I see a lot of opportunities for the future of leather,” she says. “As there is more focus on durable, long-lasting products and moving away from fossil fuel derived materials, we see a bright future for leather.” ■

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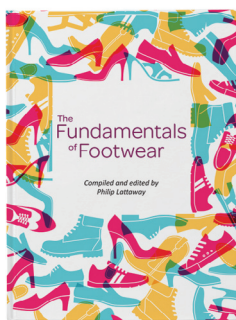


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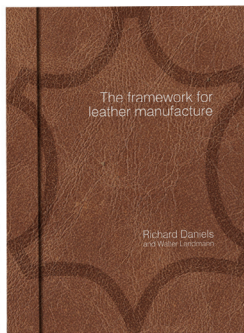
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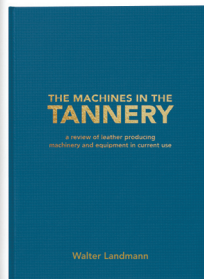
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