

WORLD FOOTWEAR

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THE MAGAZINE FOR THE GLOBAL SHOE INDUSTRY

Impact of digital technology

Reef reaches out to artisans

Dilemmas for luxury boot brand

Kobi Levi honours Cremona



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Front Cover

Violin shoe created by Kobi Levi in 2013 to commemorate the tradition of craftsmanship in the Italian city of Cremona.

Image: Kobi Levi/Shutterstock

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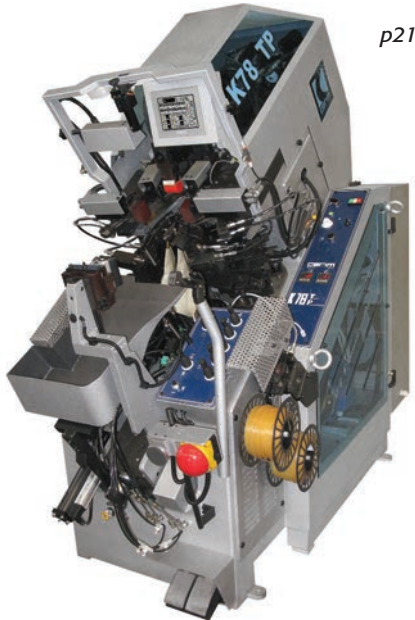
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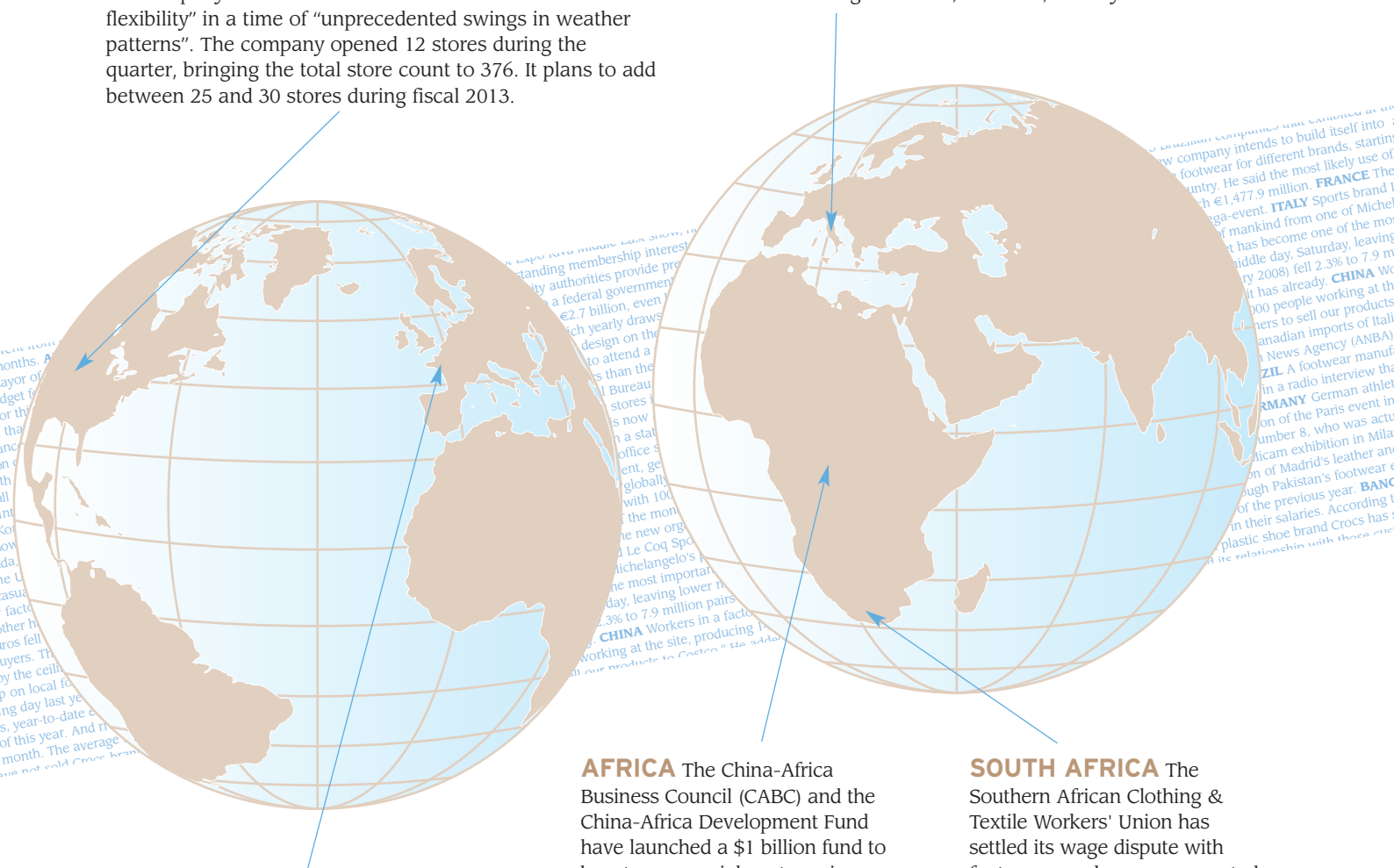
News

UNITED STATES Adidas and Nike are among the most sustainable companies in the world, according to a survey of 10,000 consumers and company reports. They are the only footwear brands to feature in the top 50. The German group came in at number 15, while its US rival was ranked 31. Toyota, Ford and Honda were the top three.

● Footwear retailer DSW has posted better-than-expected first-quarter results with sales increasing 7.7% year on year to \$601.4 million. Its chief executive, Mike MacDonald, said the company demonstrated "remarkable execution flexibility" in a time of "unprecedented swings in weather patterns". The company opened 12 stores during the quarter, bringing the total store count to 376. It plans to add between 25 and 30 stores during fiscal 2013.

ITALY Italian lawyer Paolo Viscuso has published details of a court case in Milan in which Italian tanning industry association, UNIC, was told it had no right to ask for the seizure of goods that use the well-known symbol for real leather, the outline of a hide. UNIC first filed a trademark application for the hide outline in 1977, but French shoe brand Chaussures Eram successfully argued the hide symbol had been in widespread use in many countries before 1977.

● Luxury goods brand Prada has reported growth in sales and revenues of 14% for its first quarter. Sales reached €782.3 million and revenues €138.2 million. Sales of footwear fell by 12.2%. Although its footwear sales were disappointing, Prada said sales of shoes made by its traditional English brand, Church's, rose by 2.8%.



FRANCE High-end shoe designer Christian Louboutin has said raw material shortages have led to his costs doubling in five years. With the strengthening euro against the dollar, the cost of producing shoes in Europe has increased, he explained, and a perceived leather shortage has led to luxury houses buying their own tanneries. "Now there is a gap of raw materials and leather, which puts the prices up," he said.

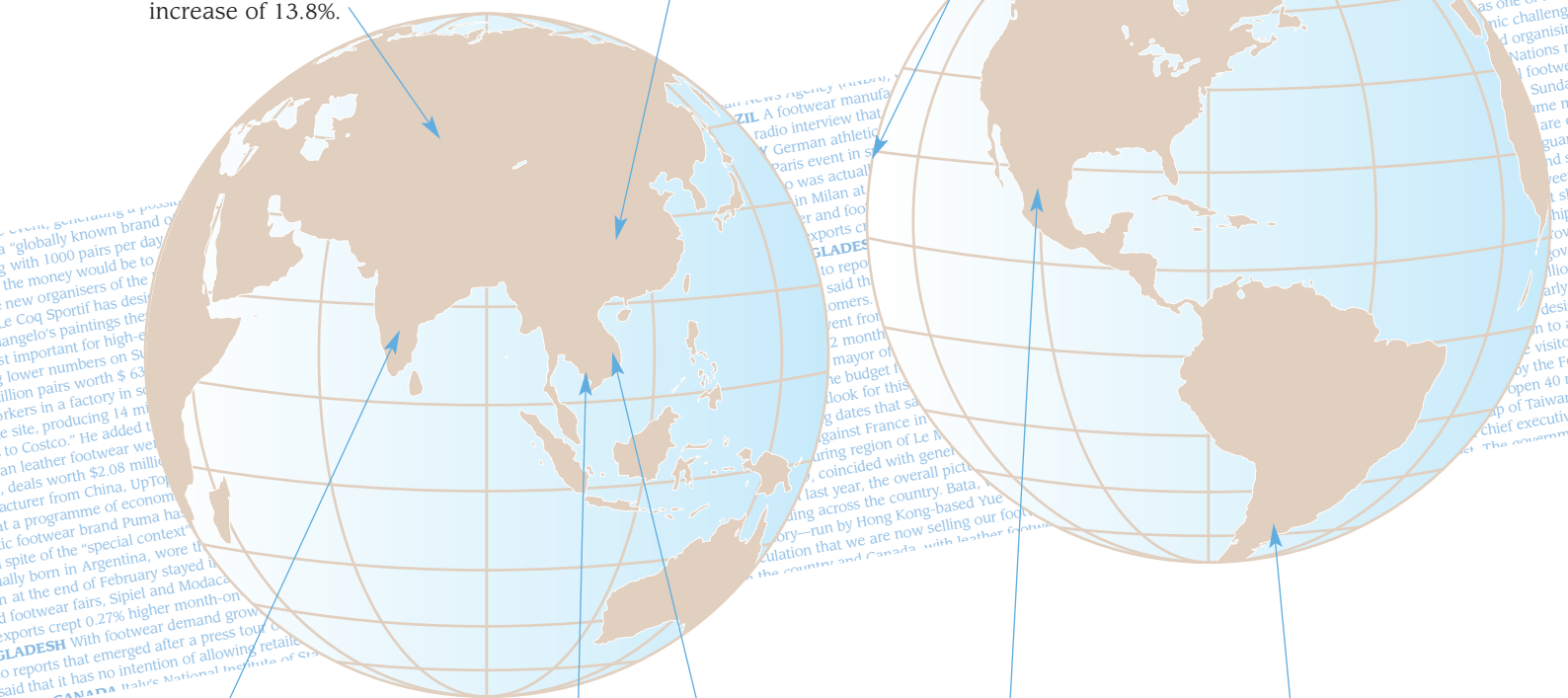
AFRICA The China-Africa Business Council (CABC) and the China-Africa Development Fund have launched a \$1 billion fund to boost commercial ventures in Africa, particularly in the footwear and textile sectors. Zheng Yuewen, chairman of CABC, said Chinese companies will move their factories to Africa to help the continent upgrade its technology.

SOUTH AFRICA The Southern African Clothing & Textile Workers' Union has settled its wage dispute with footwear employers represented by the Southern African Footwear and Leather Industries Association. Workers will benefit from a 7.75% wage increase with effect from July 1 and the settlement will cover 182 footwear companies, employing about 9,600 workers.

RUSSIA Italian footwear manufacturers association, Assocalzaturifici, has stepped up its efforts to find buyers in Russia by adding Ekaterinburg to the cities in the region to host a specific Italian footwear event. Eleven high-end Italian footwear firms took part, meeting around 30 local buyers. In 2012, Italian footwear exports to Russia reached more than 7.5 million pairs, an increase of 12% in volume, with a value of €592 million, an increase of 13.8%.

CHINA The organisers of the 18th Congress of the International Union of Shoe Industry Technicians, which will take place in Guangzhou, China, from November 13-16, have received 66 abstracts from footwear professionals who want to take part as speakers. Abstracts will be reviewed and a full programme published on July 1.

HAWAII A footwear brand is donating \$135,000 worth of shoes to local lifeguards including a style it designed specifically for the role. OluKai donates around \$20,000 annually to the Hawaii Lifeguard Association, collected from donations at 2,000 North American stockists. The company launched a light running shoe after noticing lifeguards stalling to put on footwear before they went out on jet skis.



INDIA Footwear group Bata has said it plans to open 100 stores per year, after launching 189 in 2012. Its CEO, Thomas George, said: "China and India are our largest markets. Indonesia is starting to show some tremendous amount of growth of 20% year-on-year." Bata has 1,250 stores across India and is planning more specialised stores for its licensed brands such as Hush Puppies.

VIETNAM Vietnam earned \$3.1 billion in footwear exports in the first five months of this year, a year-on-year increase of 11.4%, according to the country's General Statistics Office. The Viet Nam Leather and Footwear Association said several British and German shoe importers have been to the country recently, scouting opportunities.

ARGENTINA Government strategies to boost the footwear industry have led to local production increasing 214% over the past six years, according to research agency Euromonitor. It created 5,500 jobs by becoming less reliant on imports, which fell from 54% of the total to 27% over the period.

CAMBODIA Three people have been killed at a footwear factory in Cambodia when the ceiling of a warehouse collapsed. Ith Sam Heng, minister of social affairs, told Reuters a further six workers had been injured at the plant in the Kong Pisei district. Industry sources told *World Footwear* that tensions have been growing, with some reports of the authorities imposing a 30% increase in wages on factory owners at the start of May 2013.

MEXICO The first day of the Anpic leather and footwear exhibition in León attracted 1,818 buyers from 17 different countries, 27% more than last year. Colombia, Italy and the US were the countries that sent most visitors to the event.



Footprints



LOUBOUTIN SUES CHARLES JOURDAN

Luxury footwear brand Christian Louboutin has filed a lawsuit against US-based Charles Jourdan Fashion Footwear claiming it has infringed a trademark for red-soled women's shoes.

The French company in September won a case against YSL which ruled that the red soles are so synonymous with the brand that they should be protected by law.

Jourdan supplied counterfeit shoes to retailers in New York which were also sold on retailer DSW's website, Louboutin said in a filing in a federal court in Manhattan.

"Defendants were and are aware that the counterfeit products they sell are not genuine Louboutin products," Louboutin said in its complaint. It seeks \$2 million in damages for each mark that is infringed.

ACKERMAN'S ACT OF KINDNESS PAYS OFF AS DEMAND FOR PAPAL SHOES SURGES

An act of kindness in 2012 appears to be paying off for Mexican footwear brand Ackerman. A specialist in handmade men's shoes, León-based Ackerman made a pair of red loafers as a gift for Pope Benedict XVI when he visited the city in March last year.

At the time, company owner, Armando Martín Dueñas, was president of the local footwear manufacturers' association, CICEG, but he insisted that the Ackerman shoes were a personal rather than official gift to the pope. He delivered them by hand to the offices of

the archdiocese of León two days before the start of the visit. And it now transpires that he included a brown pair in the same style at the same time.

Ackerman spent three months researching the style and the taste of the Bavarian pope, who was included in 2007 in *Esquire* magazine's list of best-dressed men because of his taste in shoes. It made the loafers with calf leather uppers and a goatskin lining.

One of the (admittedly less important) questions that arose in February 2013 when Benedict XVI announced his resignation concerned footwear: as Pope Emeritus, would he still wear red shoes? The Vatican announced on the day of his retirement that Benedict XVI would give up the red footwear, which popes traditionally wear as a tribute to martyrs such as St Peter (the first pope). The official spokesman said on the day that a brown pair the pope had been given as a gift in Mexico in 2012 were exceptionally comfortable and would be his shoes of choice from now on.

In the three months since this ringing endorsement, Ackerman's business has grown by nearly 30%, Armando Martín Dueñas recently told the *New York Times*. "It's strengthened our entire industry," he said. "It shows that Mexico has been doing its homework. Our products are now being accepted around the world."

He told the newspaper that enquiries and orders for the shoes have come in from all over the globe and, from June, the shoes will be available to buy on the Ackerman website, in brown and black. But not red.

NEW LEADERSHIP TEAM FOR FDRA

The Footwear Distributors and Retailers of America (FDRA) has announced a new leadership team. Greg Tunney, chief executive of RG Barry, will serve as the new chairman of FDRA. Nick Grayston, president of footwear at Sears Holdings, will take the helm as FDRA's vice-chairman.

Blake Krueger, chief executive of Wolverine Worldwide, is stepping down from the trade association after two

years as chairman.

"I am honoured and humbled to be selected as the new chairman," said Greg Tunney. "I've thoroughly enjoyed working with Blake these past two years as the vice-chairman. He has done an outstanding job as chairman and I'm eager to build upon his work. One of my main goals now is to grow our membership and create new innovative services and products for the industry. I have no doubt we can make that happen."

COLE HAAN SALES EXEC TAKES PRESIDENT'S ROLE AT NINA

US brand Nina Footwear has appointed former Cole Haan VP of sales Alan Johnson to the newly created role of president.

Mr Johnson, who was also director of sales at Hugo Boss USA, will oversee design, sales and marketing for Delman and all Nina branded divisions, including shoes, bridal, handbags and children's.

He will work closely with CEO Ezra Dabah and Jason Yagoda, chief strategic officer.

"Alan's strength in sales, merchandising and creative skills will help drive our strategy as we build Nina into a lifestyle brand," said Mr Dabah. "We look forward to seeing Nina as a relevant, strong player in the daytime category while growing our dominant share of the special occasion business. We also see the opportunity to uniquely position Delman within the luxury segment under Alan's leadership."

FOOTWEAR ENTREPRENEUR WANTS MAJOR SHARE OF AIRPORT

The founder of prominent Italian footwear brand Baldinini has told local media that he would be prepared to invest in a local airport because it has helped his company build up a strong export business in markets such as Russia.

Rimini airport in Emilia-Romagna has suffered a decline in passenger numbers, from more than 920,000 in 2011 to fewer than 800,000 last year,

and the company that runs it, Aeradria, is looking for new investors.

Baldinini is based in San Mauro Pascoli, about 30 kilometres north of the airport. It has been able to use the direct links provided by several different airways to Russia (Italy's Adriatic Coast is a popular holiday destination for wealthy Russians) to build up its business there and founder, Gimmi Baldinini, has said he would like to invest to help the airport continue operating.

However, in recent comments to local media, Mr Baldinini made it clear that he wants to be a major shareholder and not hold just a small stake in the airport's operating company. "I am very interested," he said. "But if I get involved, I won't be content with just a small share. I want to be the majority shareholder in the business."

HARLEY DAVIDSON VP OF FOOTWEAR DIES IN MOTORBIKE ACCIDENT

Reports from the US say the vice-president of footwear for Harley Davidson has died in a motorbike accident on his way home from the Blessing of the Bikes ceremony in Baldwin, US.

Herbert Burgnon had been a lifelong bike enthusiast and had worked for the company, owned by Wolverine Worldwide, for 15 years. Police reports suggest his bike hit the back of a stationary car.

"Since he was a rider, he could test a lot of ideas. He lived the brand so he understood all the elements of it," Michael Hebreard, Mr Burgnon's former boss and head of Wolverine's Cushe brand, told MLive.com.

Mr Burgnon was involved with the Two Ten Footwear Foundation, which supports footwear workers, and his family have asked for any donations to go to the foundation.

FORMER NIKE EXEC TAKES TOP JOB AT LACROSSE

LaCrosse Footwear, a US brand bought by a Japanese retailer last year, has appointed a new president.

Robert Sasaki, formerly a finance director at Nike, mainly focused on Asia.

LaCrosse's CEO Joseph Schneider and chief financial officer David Carlson stepped down when ABC Mart purchased the company for \$138 million in July last year.

Novak Djokovic seen here at the Australian Open in January.

CREDIT: NEALE COUSLAND/SHUTTERSTOCK.COM



DJOKOVIC DEBUTS NEW VERSION OF ADIDAS SHOE IN PARIS

Sports brand adidas has unveiled a new footwear partnership with the current world number-one tennis player, Novak Djokovic. The Serbian star wore the new shoes, called Barricade 7, at the 2013 French Open (Roland Garros) tournament at the end of May and start of June.

Novak Djokovic has worn adidas Barricade shoes for many years from personal choice, winning all six of the Grand Slam titles he has achieved so far while wearing the shoe.

Commenting on the new sponsorship deal that flowed from this preference, the player said: "The adidas Barricade is my favourite shoe. I have been wearing it for many years and have worn all the different generations. I have full confidence in the shoe and am very comfortable on the court when I wear it, which is essential for a tennis player. I have very specific dynamic movements, with a lot of splits and slides, so I need to have the right stability in the shoe, but also have an optimal weight and great performance. The Barricade offers me everything."

Mr Sasaki said in a statement: "We recognise the unique opportunity for legendary American heritage brands Danner and LaCrosse to partner with Japan's leading footwear retailer."

The Japanese group has promised investment in manufacturing and distribution in Europe and Asia.

FOOTBALANCE NAMES DIRECTOR FOR NORTH AMERICA

Finnish foodbed technology provider Footbalance has named a new managing director for its North American business.

Jeremy Town has been promoted from North American vice-president of finance, a position he has held for a year. He will continue as the head of finance in the US and Canada while also leading all aspects of the North American operation.

Mr Town's experience includes

management roles with Amer Sports, as well as several finance positions for technology giant IBM. In his new role he will adapt global business plans to the North American market, build partnerships and launch new products.

"It's been exciting to be part of the growth Footbalance North America has seen in the last year, and I'm confident we'll continue to succeed and make a difference in the industry," said Mr Town. "As a sports and outdoor enthusiast, I know how important fit, comfort and performance are when it comes to footwear. So, it's extremely satisfying come to work every day knowing that we're improving this for so many people."

Footbalance was developed by a Finnish physiotherapist specialising in podiatric medicine. The system enables the production of customised footbeds at retail stores in less than 10 minutes.🌀

Products & Services

NEW SATRA WATER-RESISTANCE TEST

Research and testing body SATRA has announced a new test method and machine, which, it has said, are “set to change the way footwear is tested for water resistance”.

The new TM444 test method and test machine STM 640 can evaluate resistance to non-flex induced water penetration in all footwear products in just over ten minutes, and without causing damage to the materials or product, SATRA has claimed.

“This makes TM444 ideal for production testing and sets it apart from existing water-resistance test methods that can be relatively time-consuming and cause damage and fatigue to the footwear being assessed,” the organisation said in a statement in May. “For manufacturers and suppliers of footwear claiming to offer water resistance, it is vital to have these claims assessed before placing the product on the market. SATRA’s TM444 and STM 640 will help them validate these claims.”

TM444 is based on a centrifuge principle. A sample of footwear is weighed and securely placed in a container which is then filled with water to a known depth. The container is attached to a vertical shaft within the centrifuge and spun rapidly so that the water exerts pressure on the outside of the footwear.

At the end of the test, the footwear is inspected and reweighed to determine the level of water penetration. Commenting on the new test method and machine, SATRA’s head of research, Tom Bayes, said: “The new TM444 and STM 630 have come about through our commitment to research and innovation, with the ultimate aim being to help our members develop the best possible products in the shortest possible time.”

NEW SUPPLY CHAIN TOOL FROM TEXBASE

Specialist software provider TEXbase has launched GuardianSM, which it describes as an “advanced



CREDIT: BRETT NATTRASS / SHUTTERSTOCK

RESEARCH SAYS NO EVIDENCE ‘BAREFOOT’ CAUSES FEWER INJURIES

Researchers at the Human Performance Laboratory at the University of Calgary have published a series of findings on barefoot running’s effects on foot motion, training, running economy and injury.

In the new scientific paper, the researchers, Benno Nigg and Henrik Enders, first examined the claim that running without shoes encourages a ‘forefoot’ rather than a ‘heel’ landing, making runners less prone to injury. They dispute this, saying that not only does the available research not prove any reduced injury risk, other factors like the running surface, shoe choice, speed and individual preferences play too large a role to make such generalisations possible. Likewise, the researchers found no difference between shod and barefoot movements in their ability to strengthen certain muscles.

The additional weight of a shoe (up to about 300 grammes) didn’t seem to have much effect on performance, either, the paper says. What seemed to make more of a difference was what they call the “preferred movement pattern”: the combination of chosen footwear and a runner’s preferred strike pattern.

The University of Calgary researchers say they know of no published research that provides hard evidence that people running barefoot have fewer injuries than people running in shoes. They concluded: “It is not known whether people running barefoot have more, equal, or fewer injuries than people running in conventional running shoes.”

Runners run best when they’re comfortable, they say in the paper, whatever they’re wearing on their feet.

Their research has been published under the title “Barefoot running – some critical considerations” in the journal *Footwear Science*, Vol. 5, No. 1, 1–7, published by Taylor & Francis.

solution for management of corporate and social compliance requirements”.

It says regardless of size or complexity, brands and retailers can build transparency across their global supply chain as the system enables standardisation, easy accessibility and

visibility across a global user base.

Features include a solution for managing product specifications, testing plans and results required by the US’s Consumer Product Safety Improvement Act; and CSR Guardian, which allows companies to track and

measure their corporate social responsibility programmes.

The company is sponsoring the American Apparel & Footwear Association's Supply Chain Traceability seminar on July 10, in Santa Monica, California. The seminar will focus on the broad compliance and regulatory challenges facing the apparel and footwear industry.

DELCAM AIMS TO SIMPLIFY COMMUNICATION

Footwear technology supplier Delcam Crispin has launched a suite of project management and collaboration software which it says will enable more efficient management of design and manufacturing data along a supply chain.

ShoeCloud can be integrated within the Crispin range of software for 3D footwear design or, for staff not directly involved in design and manufacturing, data can be accessed through standard web browsers and email.

Delcam says the programme will be of most benefit for organisations that undertake design in North America or Europe and manufacturing in Asia. By enabling easier and faster exchange of data between the two regions, detailed project management will be possible with a reduction in the time and cost of international travel, it says.

The company has also launched updated versions of 3D design program ShoeMaker and the Engineer Pro manufacturing software.

Engineer Pro produces 2D sample and graded footwear patterns for manufacturing. A new module, ShoeStyle, has been added for drawing, sketching and editing 3D style lines.

ShoeStyle provides functionality to import lasts, in STL or IGES formats, and create style lines directly on the last. This can be done using point-to-point, streamline sketching or by merging of multiple sketch lines using a graphics tablet.

REVAMPED LEATHER FINISHES FOR FOOTWEAR INDUSTRY

Swiss chemicals group Clariant has formulated its Melio Softfix ANV especially for finishing aniline, nappa and nubuck to meet the demand for a

more natural type of leather for the footwear and garment sectors.

Melio Softfix ANV is a versatile type of NMP/NEP-free, aqueous, finest particle size polymer dispersion that helps with colour correction and enhancement on nubuck and improves rub fastness. It also helps maintain the writing effect on suede.

NEW FOOTWEAR TEXTILE FROM INVISTA

Taiwanese textile company Tiong Liong has collaborated with Invista to expand its Air Flow Technology (AFT) fabric with new knit constructions featuring enhanced abrasion and

snagging resistance.

Targeted primarily for outdoor, athletic and safety footwear, the breathable fabrics can also be used in mesh applications in backpacks.

The Cordura AFT fabric collection now includes high tenacity polyester and nylon 6,6 offerings in a range of knits capable of foam or felt lamination and 3D spacer fabric constructions, suitable for sports shoes.

Cindy McNaull, Cordura brand director, said: "Our aim is to improve the end-user experience by supporting the development of lightweight products designed to withstand extreme conditions." 



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Backtrack

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 those you have missed.

20.06.13

OTZ targets Italy with distribution deal
Puma to build Nordic central warehouse
Cushe collaborates with Hoffman for new collection

19.06.13

Adidas targets record football revenues for 2014

18.06.13

Special shoes as Justin Rose wins first golf major

14.06.2013

Footwear factory musical wins big at Tony Awards
Dates announced for UTECH North America

13.06.13

ZDHC group updates roadmap goals
Tenson to extend spring-summer collection into 2014

12.06.13

Outdoor and sports key as VF Corporation aims for double-digit growth

11.06.2013

Puma joins Bangladesh accord
Kristian Steinberg designs a boot for The Left Shoe Company

10.06.13

Chicago investors buy TPU manufacturer
Adidas Nitrocharge created for 'the engine' player

07.06.13

ASICS agrees footwear deal with England Netball

06.06.13

Cole Haan teams up with former owner

05.06.13

Limited places at Beast to Beauty conference
Ecco reacts to Russian ban on synthetic shoe linings

04.06.13

Vietnam: Footwear association wades into minimum wage debate

03.06.13

Adidas attempts to resuscitate Reebok

30.05.13

Frau says its female focus will pay off
Nike creates football boot for 'new breed' of player

29.05.13

Chinese sports brand issues profit warning

28.05.2013

'Best ideas are ones you stumble across' – Puma designer

24.05.13

Decathlon plans expansion in Belgium

23.05.13

Scarosso confirms Stockholm pop-up store

Marco Reus will show off Puma boots at Wembley

Kobi Levi shoes to go on show at Waalwijk museum

22.05.13

China's Erke targets India

21.05.13

Feng Tay reports production up in April
K-Swiss buys fast-growing OTZ brand

20.05.13

Organisers announce dates for Riva Schuh India
Call for projects to share €31.5m EU pot

17.05.13

UK brand to launch footwear children can draw on
New Reef collection features artisan materials from Togo and Guatemala

16.05.13

Geox pins hopes on Asia as Italian sales fall a third
Skechers ordered to pay \$40m over Shape-Up toning claims
Main Group prepares for Guangzhou event
Clarks to take over Brantano stores (for two weeks)
Ferragamo doubles profit in first quarter

footwearbiz.com

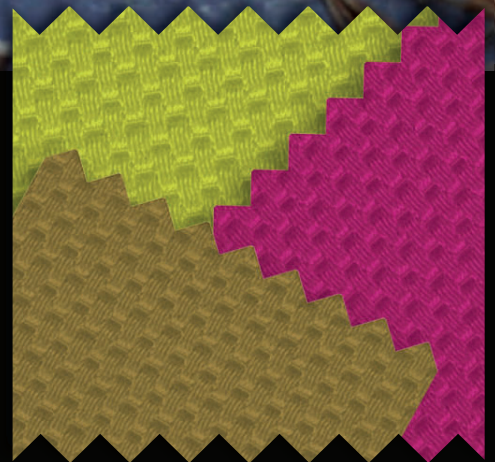
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GLOBAL FOOTWEAR
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Bellas Costa boots from Reef incorporate in the upper a hand-woven fabric from artisans in Guatemala.

CREDIT: REEF



Reef reaches out

VF Corporation footwear brand Reef has built material from artisans in Togo, Uganda and Guatemala into its latest collection. The collection, for autumn-winter 2013-2014, is an expansion of the Bellas Costa line that Reef introduced for spring 2012. It now comprises ballets, moccasins, slip-ons, lace-ups, Huarache, and pointy-toe flats silhouettes, as well as a tall riding boot, a mid-height wedge and a trendy studded short boot.

At the premium end of the line, boots have leather uppers and a quilted footbed, with select styles featuring hand-woven fabrics from Guatemala. In addition, Guatemalan crochet work will feature on the Reef Costa Capri, the Reef Tropic and the Reef Winter Drift styles and will also appear in the boots with the Santa Marta.

The surf lifestyle-inspired brand's partnership with artisans in Togo is newer, using hand-dyed batik fabric in the Reef Bochica and Reef Harbour styles. Also in Africa, the brand has sourced beads from Uganda, to use as decorative elements in some of its sandals.

Californian footwear brand Reef has built into its sourcing strategy a series of projects that involve specialist components and materials from small communities of artisans in developing economies in different parts of the world.

All of this is part of a programme called We Heart, an ongoing collaboration between Reef's design team and artisans from developing countries around the world. Reef purchases their handmade crafts and incorporates them into its shoes. The aim is to provide a platform for the artisans to grow a business out of a traditional craft and, through trade with Reef and other customers, to build stronger communities, and all through sharing their work with the world.

A senior member of the Reef design team, Brianna Marks, is the person who spearheads the We Heart programme and explains that the materials from Guatemala were among the first to catch her eye. She says she was attracted to the material from the start, perhaps because it resonated with Reef's Latin heritage. It's a southern California brand but it was founded in the 1980s by two brothers from Argentina, Fernando and Santiago Aguerre, who decided they wanted to be "at the centre of the surfing universe". They built the company up from nothing before selling it to VF Corporation in 2005 for a reported \$100 million.

Traditional ways

Bright colours, traditional patterns and interesting textures are all part of the heritage they have left behind. "When I visited the communities that we work with in Guatemala," Ms Marks explains, "I was able to see how the handicrafts are still made in the traditional ways, in their houses, made by hand. I was touched by the reality of their situations. These are beautiful people that truly rely on us to make a living and provide for their families." Weavers in and around the town of San Antonio Palopó in the south of the country use hand-looms and traditional techniques to make the material Reef sources. In the first two years, the project has provided 150 local artisans with sustainable employment. One of the weavers, Andrés Pérez, has said: "This all came as a great surprise to us. We never imagined that what we make here could be interesting for the outside world. We're seeing something we've never seen before and it makes us very happy." Since 2010, Reef has sourced almost 25,000 metres of hand-woven fabric from Mr Pérez and the other artisans in this community.

In Togo, Reef's sourcing has built up through a local woman named Chantal, who was able to build her tie-dye and batik business from the ground up. "It's an amazing feat for a woman in that part of the world," Brianna Marks says. "She now employs other women who have no other means of employment or caring for their children." They make their tie-dye batik cotton fabric using techniques for tying, dyeing and drying that have passed down through generations.

And the project in Uganda involves a group of 60 women in the north of the country, some of whom have HIV. They have spoken of being able to give their children an education and a better start in life thanks to Reef's commitment to putting the beads they make (more than a million of them so far) on to sandals for surfers.

Partner projects

Reef's We Heart programme started in 2010. Ms Marks explains that the footwear brand has worked with a number of development organisations to source hand-crafted materials. For example, its contacts in Guatemala have been cemented through partnerships with Nest and Collaborative Group. Nest, a New York-based non-profit organisation, is dedicated to finding and working with artisan businesses to help them build up their capacity, to become profitable and to have a significant positive social impact. For its part, Collaborative Group functions as an online marketplace specifically for connecting retail brands with artisans in the developing world. It has described hooking up artisans in San Antonio Palopó with Reef as "a match made in heaven". "We usually try to

keep the business consistent and sustainable for at least several seasons," she says. "I generally find partnerships through mutual contacts or sometimes just searching the web for sustainable sourcing. I always have everyone's eyes and ears out for cool stories; touching stories of communities are always where the ideas start."

The programme is ongoing. A new partnership will start soon with a community of women in rural southern India who make detailed ikat-style fabrics that Brianna Marks describes as "amazingly beautiful". We Heart will provide around 115 artisans in that area with employment, the footwear brand says.

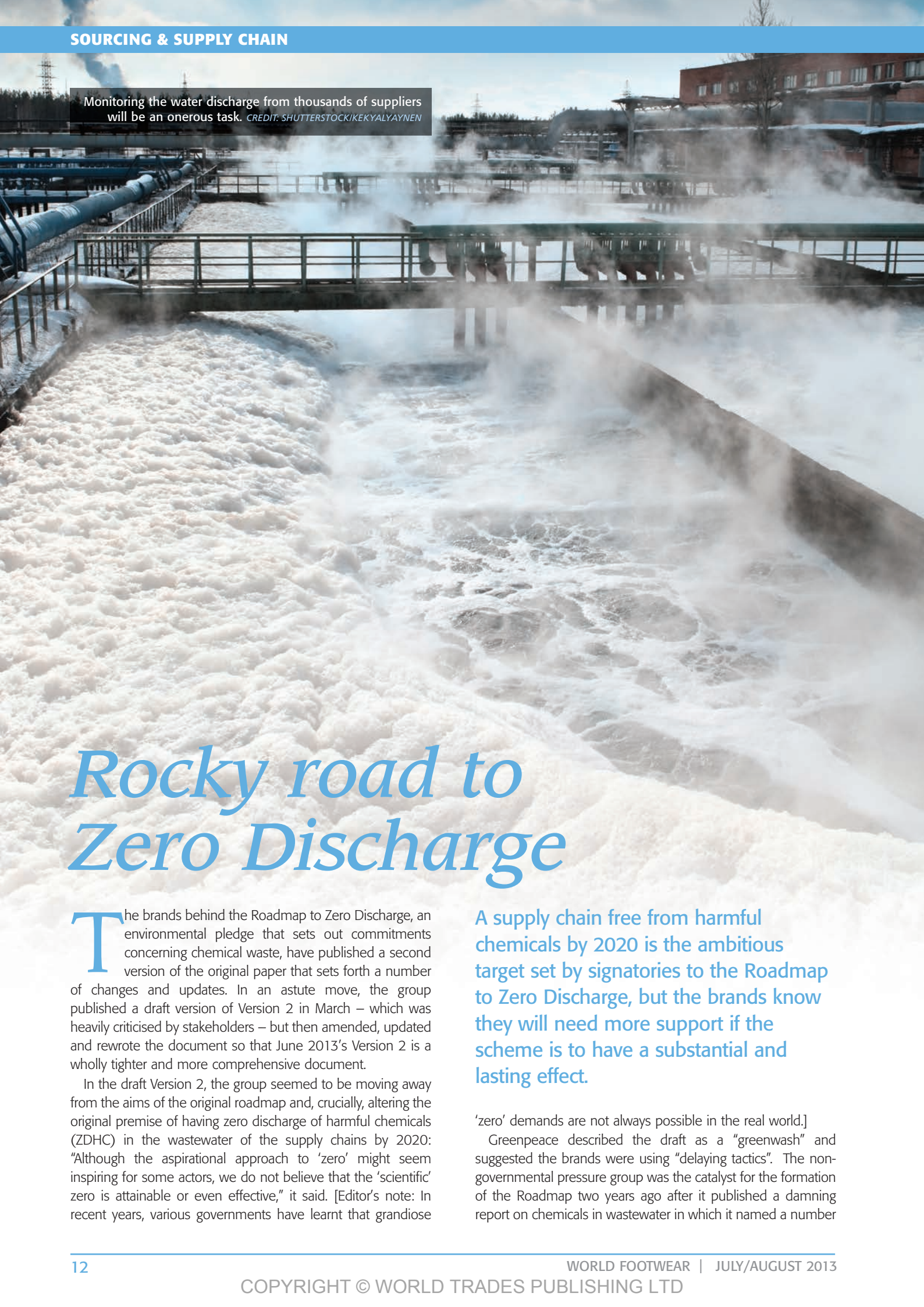
Trade not aid

Reef's belief is that trade is better than aid and that, in the words of Ms Marks, that it's better to give communities a hand-up than a hand-out. "Giving a person a fish will feed them for a day, but teaching a person to fish will feed them for a lifetime," she continues. "We also think that it is so important to preserve heritage and cultural traditions, so that we can learn from people around the world instead of trying to change them." Helping people to make a living from practising traditional crafts is to make a contribution to eradicating poverty and developing rural economies. Knock-on effects include decreases in infant mortality, better access to education and healthcare and more sustainable communities. There is a lot for Reef to be proud of. 



Flats from the latest Reef collection.

CREDIT: REEF



Monitoring the water discharge from thousands of suppliers will be an onerous task. CREDIT: SHUTTERSTOCK/KEKYALYAYNEN

Rocky road to Zero Discharge

The brands behind the Roadmap to Zero Discharge, an environmental pledge that sets out commitments concerning chemical waste, have published a second version of the original paper that sets forth a number of changes and updates. In an astute move, the group published a draft version of Version 2 in March – which was heavily criticised by stakeholders – but then amended, updated and rewrote the document so that June 2013's Version 2 is a wholly tighter and more comprehensive document.

In the draft Version 2, the group seemed to be moving away from the aims of the original roadmap and, crucially, altering the original premise of having zero discharge of harmful chemicals (ZDHC) in the wastewater of the supply chains by 2020: "Although the aspirational approach to 'zero' might seem inspiring for some actors, we do not believe that the 'scientific' zero is attainable or even effective," it said. [Editor's note: In recent years, various governments have learnt that grandiose

A supply chain free from harmful chemicals by 2020 is the ambitious target set by signatories to the Roadmap to Zero Discharge, but the brands know they will need more support if the scheme is to have a substantial and lasting effect.

'zero' demands are not always possible in the real world.]

Greenpeace described the draft as a "greenwash" and suggested the brands were using "delaying tactics". The non-governmental pressure group was the catalyst for the formation of the Roadmap two years ago after it published a damning report on chemicals in wastewater in which it named a number

of the brands involved.

A group of stakeholders – representatives from chemical companies, NGOs and technical experts among them – were also critical of the draft, describing it as ‘over-bureaucratic’. “If it substitutes Version 1, we see quite a significant weakening of the project,” they said.

Stakeholders comments were addressed in Version 2, but that did not allay Greenpeace. “The ambition and actions shown by this group seem out of touch with both the reality on the ground, and the demands of the brand's stakeholders, fans and customers,” it said in a statement published in mid-June. Worse, the “slow progress” has “delayed and frustrated the progress of other more ambitious brands”, it added.

For the signatories to the Roadmap – which include Nike, adidas, Puma, Li Ning, G-Star Raw and Jack Wolfskin – the new version is merely an evolution of what was always going to be a challenging goal. After the initial draft in late 2011, stakeholders more or less said the goal was not possible: “The timeline is unrealistic. Eight years is not enough to change buyer and supplier practices, develop suitable chemical alternatives and impose and/or change regulatory structures,” they said – a disheartening summation for the brands.

However, they were undeterred: “ZDHC is an enormously complex undertaking and 2020 is a challenging timeline. However, goals are more effective when time bound, and the ZDHC members and partners will do their utmost to achieve the goal.”

Priority chemicals

The original aim of the project was to eliminate the discharge of hazardous chemicals in two categories: 11 priority chemical groups, nine of which are already banned from the products, and other chemicals that are restricted or controlled under national legislations. Of the nine already banned products, the aim was to test whether any appeared in water or sludge of supplier factories and, if so, to eliminate them by the middle of this year.

The tenth group of chemicals, APEOs/NPEs, are used across textile and leather manufacturing industries as detergents, so the plan was to draw up a list of detergents that do not contain these and ask suppliers to swap. The eleventh category is the perfluorinated and polyfluorinated chemicals (PFOA/PFOS) group, used for water repellency and over which there has been much debate in the footwear and outdoor industry.

Once more, the shareholders cast doubt over whether the elimination of these chemicals would even be possible. “Many processes in apparel and footwear manufacturing use chemicals that are reactive and a chemical that is non-hazardous going into a process may react with another and become hazardous,” they said in the consultation. A few stakeholders cited the implications of switching chemicals, as changes might lessen one burden, such as toxics, but increase others, such as greenhouse gas emissions.

Benchmarking process

Throughout 2012, the brands undertook pilot schemes. They selected a sample of suppliers that ensured a mix of processes, raw materials and locations. The sportswear brands conducted benchmarking at four sites in China, three in India and one in Vietnam, while the fashion brands investigated five sites in Bangladesh, three in India and three in China.

Over the year, Sustainable Textile Solutions, a division of textile coloration specialist DyStar, helped monitor the wastewater in some of the factories. Chemicals management assessments were carried out, which revealed the presence of the banned chemicals – APEOs, azo dyes, chlorobenzenes, heavy metals, phthalates and short-chained paraffins. Some suppliers had difficulty obtaining specific information on chemicals, due to confidential business concerns.

As well as the pilot tests, the Roadmap group compiled a list of chemicals used in the industry, in collaboration with chemicals companies such as Huntsman, and identified preferred chemistries and mechanisms to incentivise chemical suppliers to invest in the alternatives. “While our inventory is not exhaustive, we believe it to be the most complete, publicly available compilation of information on chemicals used in the textile industry,” they said.

Water repellence

All ZDHC brands committed to phase out the use of long-chain PFCs by no later than January 1, 2015. These substances deliver protection from the weather, keep shoes looking new and increase their longevity. PFOA – generally regarded as harmful – is not an ingredient that manufacturers deliberately add in the making of their products, but a substance that appears in small quantities as a by-product of the synthesis that takes place in the making of C8 chemicals.

“More innovation is needed in order for all ZDHC brands to commit to a complete phase-out of fluorinated repellent technologies at this stage, especially for high performance products,” said the first draft. “However, we recognise there is a strong call to completely move away from fluorinated chemistry, and we will therefore invest in follow-up research to assess the feasibility of alternative technologies.”

After the first year of research, the brands conceded in the draft of Version 2: “The move from fluorinated to non-fluorinated durable water repellent chemistries is challenging. Substitutions for perfluorinated chemistry will require extensive research, if it is at all possible.”

This was again updated in Version 2: “Especially for high performance levels, there are at the moment no PFC-free alternative products available on the market with equivalent functional properties. We aim to encourage innovation and development of sustainable chemistries in general and specifically for potentially hazardous substances that are difficult to substitute. We also want to ensure that we avoid regrettable substitutions by assessing new chemistries before introducing them in our supply chain.”

Some of the alternatives chemicals companies have spent years working to develop are members of the same family of chemicals but based on short-chain C6 rather than C8 chemistry and their manufacturers are confident footwear and apparel companies using them will be free from the risk of detectable levels of PFOA forming in their products.

Changing direction

One of the main concerns from stakeholders in the draft of Version 2 was that it seemed to be watering down the goals and moving away from some of the original aims, particularly in respect to deadlines and timelines.

In it, the group said two key outcomes were “the need to address the biggest environmental impacts from the



manufacturing industry, not necessarily resulting from the intrinsic 'most hazardous chemicals' but potentially water consumption, biochemical oxygen demand and chemical oxygen demand; and the need to implement a risk management strategy".

Stakeholder feedback suggested this could be widened to general health and safety in the workplace, particularly in light of some recent building fires in the textile industry. But the group thought this was a step too far: "Other parts of our organisations are working on improving this crucial issue and for most brands this is considered a labour compliance issue and is managed in other brand programmes focusing on labour compliance." As such, the extension to "overall life cycle and socioeconomic aspects" is not mentioned in Version 2.

The list of 11 chemicals were not focused on in the second draft, instead: "As a group, the textile industry will need to identify and prioritise chemical substances of concern and substitute them with safer alternatives."

Stakeholders wondered: "What about other substance groups and phase-out targets? What happened to the inventory list?" they said. "Do not let Greenpeace set the chemical classes; say which you think are the highest priority."

Taking the comments on board, there is more emphasis on chemicals in the final Version 2 – although not specifically restricted to the 11. "We reincorporated many of the principles, definitions and the focus on hazardous chemicals that were present in the first Joint Roadmap. It was never the intention to change or remove ourselves from the first version of the Roadmap," said the brands.

Suppliers' role

One of the key questions that has been raised is who will pay for all the changes that might need to occur to reach the target, such as control technology, auditing or the move to greener chemicals. "We wish to move the industry to new levels of transparency in chemical usage, but we must also understand the technical capacity and cost and regulatory implications for individual suppliers to meet this expectation," said the first report.

At the consultation, shareholders suggested the suppliers might not be able to afford to make alterations, or that perhaps, if forced to change, they might direct money away from wages to pay for greener chemicals.

The brands responded in the draft of Version 2: "An important part of systems change is to reward suppliers that are strong environmental performers. We envision this will include a best-practices procedure on how to develop a sourcing programme that incentivises strong environmental

From the raw materials providers through to finished products, ZDHC brands need everyone on side if they are to meet their goal.

CREDIT: SHUTTERSTOCK/AFRICA STUDIO

performance, including strong integrated chemicals management. In complement there will be guidance developed to delist or remediate suppliers that are not conforming to our standards."

Certification group Bureau Veritas set up a monitoring system specifically related to the Roadmap. Senior director Samuel Wong said: "Our service has been designed to help manufacturers demonstrate their environmental credentials so they can ... remain part of the textiles supply chain."

However, no mention of the delisting in the final Version 2, rather an admission that the brands need to present a clear message: "This collective voice becomes more important as we move further into our supply chains, where each individual brand makes up only a small percentage of business volume at tier two and three suppliers."

Again, stakeholders warned: "The key factors will be having sound measurement and verification of performance and making the business case for engagement. If there is no business case, the supply chain will be as bad as the market will allow."

The next stage of the programme encompasses online and in-person training schemes. The ZDHC brands aim to have introduced this in the top suppliers providing 50% of the brands' total production by 2015, and "achieve industry acceptance and demand for ZDHC's offered trainings". In terms of cost, the group suggested this would be looked at on a brand-by-brand basis, due to antitrust and competition principles.

Collaboration

For the project to reach its aims and have the desired impact, more companies and suppliers must sign up. "Expansion of ZDHC participation is crucial in order to tackle the complex issues involved and to lift these challenges from a few industry leaders to the entire industry," said the brands.

The group aims to have 20 signatories by the end of this year, and 30 by the end of 2014. They have also requested chemicals groups become active members.

"Our greatest challenge remains in galvanising support throughout the supply chain," they admit. "Ultimately, the industry needs to set the compass needle towards the same 2020 goals as the ZDHC members. We need alignment and commitment throughout the industry, as well as the resources from all players, if we are going to succeed." 

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We are used to thinking that shoes are made of leather, synthetics and many other materials that we can touch and see when we look at them in a shop or wear them on our feet. We also acknowledge that to make them nice and attractive, intelligence and skilled labour are needed, with both tangible and intangible contributions being necessary to craft the product we love. We must now become aware that today's shoes are made of 'bits', no less important than the other elements mentioned.

The digitalisation of the shoe world is a process that started more than two decades ago with the first appearance of computers, computer aided design software programs and numerically controlled machines at shop floor level. It was an evolution that was common to all the main manufacturing sectors although the footwear industry was relatively slow in absorbing the transformations that were already affecting others. Nevertheless this 'digital divide' reduced over time and shoemaking today is as digital as many other similar processes in the manufacture of different consumer goods.

Computers were used initially in the footwear industry, as in many others, to 'crunch numbers' and elaborate rapidly and precisely all the data that accounting, administration and production planning departments had to deal with. At that time graphic systems did not exist, screens of the cathode ray tube type only displayed numbers and letters and the computing power of the most powerful machines would not have matched that of an entry level mobile phone of today. Then computer graphics and computational geometry made possible the transformation of shoe designers' sketches and the lines they drew on paper into elaborated 2D projects and highly realistic 3D digital mock ups of the shoes to be produced. Bits and bytes entered design departments and creative studios revolutionising work methods, design tools and the mind-set of shoe designers.

BITS

Bits in the design meant bits were also available for the manufacturing process. A new breed of machines appeared that took full advantage of the digital revolution to manage cutting operations. At first they continued to use traditional knives and then totally eliminated these in NC controlled die-less cutting machines. Lasting operations and other more or less

complex manufacturing steps followed. Manufacturing became less hardware and more software, forcing companies to modernise their approach and to upgrade the skills of their workforce.

This so called 'soft' invasion is now unstoppable. The Internet has propelled shoe companies and their products into the immaterial world of the web where real shops have been replaced by virtual ones, retailers have become e-tailers



Soccer boot with sintered outsole.

CREDIT: NIKE

and consumers play a role few could have imagined only a few years ago. Social media has done the rest and given consumers in the digital world a power that was unimaginable in the physical one. Bits can determine the success of a product or destroy the reputation of a company at the speed of the fastest data transfer.

According to futurist Ray Kurzweil in his book 'The singularity is near', a discontinuity in the normal speed of technical evolution is approaching that will lead to a physical restructuring of an article driven by developments in so-called 3D printing technologies that will lead to 'personal digital manufacturing'. A new generation of 'makers' stands ready to take its place in the shoe production process that has the potential to radically transform producer consumer relationships. The purpose of this article is to trace the voyage of the bits through and across the processes that transform an idea into the product we know. At the end of this journey we will be surprised by how pervasive digital technologies have become and by how big their growth potential remains.

DIGITAL DESIGN

Using graphic design software to draw the first conceptual ideas of a shoe and CAD programs to transform these into a product through steps such as 3D modelling, shell flattening, pattern engineering and grading can nowadays be considered common practice. The debate between 3D philosophers whose credo originates from the basic fact that shoes are three dimensional and should be treated as such by any design software and 2D pragmatists who would rather stick to the classical pattern engineering school remains unresolved. Nevertheless, there are no longer any doubts that digital design is more efficient, more flexible and can generate an enormous amount of information (digital data) whose utilisation goes largely beyond the boundaries of the design department.

An accurate 3D model of a shoe with a careful reproduction of all its components, the various materials it is made from, their thicknesses, textures, properties and layering can generate a highly realistic rendering of the shoe itself in the form of a 'virtual prototype'. Specialised software tools exist that are able to place it in an appropriate



Virtual mock up of a high quality man's shoe.

CREDIT: SUTORIA FOR CALZATURIFICIO PAKERSON

scenario and with an accurate reproduction of the effects of light on the various materials involved. The final result is often almost impossible to distinguish from a photograph of a real prototype. There is just one difference however: virtual prototypes are much cheaper to produce. They can also be changed much more easily, transferred from one place to another at virtually no cost and evaluated by buyers and end users long before any manufacturing commitment is taken, a marked superiority of 'bits' versus 'atoms'.

VIRTUAL REALITY

Virtual prototyping relates to virtual reality as real prototypes do to reality. In the digital (virtual) world things simply happen faster and at a lower cost. There are several other examples that we can make such as shoe configurators for instance. These are special software applications that enable consumers to configure a personalised pair of shoes by choosing from the various style, accessory, material and colour options the producer makes available when they order online or in a shop. In such a scenario there is no physical interaction between the customer and the real product until they receive the finished product and the only guide they will have in the whole purchasing process is visual; the highly realistic digital model of the shoe they have created themselves. Quasi-real rendering effects are paramount in this situation

because they can make all the difference between a purchase transaction and a missed sale.

AUGMENTED REALITY

And again, if the digital model of the shoe is so realistic, why should I not see it on my feet just as if I was really wearing them? This takes us to another realm of the digital world, augmented reality. Devices such as 'magic' or virtual mirrors can combine real, dynamic images of the consumer standing in front of a camera wearing a digital model of the as yet non-existent shoe.

Bits can also be easily tweaked. For instance, let's take the digital model of the shoe we mentioned earlier and change the focus from aesthetics to function. Instead of concentrating on accurately reproducing the texture and thickness of a material, let's see if it is possible to model its physical properties (flexibility, mechanical resistance, thermal behaviour and wear properties) and to incorporate these into the 3D model. What we obtain is a functional digital prototype that can be used to predict the shoe's behaviour, performance and interaction with the foot. This is what major producers of sports shoes such as adidas, Nike and Decathlon now do in their R&D departments at a level of sophistication rivalling that of the automotive or aerospace industries. Not bad for a so-called traditional sector and all thanks to CAD software and 3D digital models.

DIGITAL PROCESSES

Bits migrate from the design to the manufacturing processes. Pattern contours from 2D CAD or trajectories of various kinds extracted from 3D digital models, feed and control a wide range of machines from the obvious die-less cutting tables to NC stitching stations, programmable lasting machines, roughing and cementing systems through to robots executing a variety of tasks. A continuous stream of data flows from design to manufacturing. Data in fact exists all over the manufacturing plant in the exchange of status and operational information between machines and manufacturing execution systems (MES) as well as identification of data stored in components and finished shoes. It is all forwarded to centralised supervision systems through RFID (radio frequency identification) devices reading the tag that contains the data. Production is more and more immersed in a cloud of bits that ensure its smooth and controlled functioning, clouds that cannot be seen but are vital for the daily activity of the factory.



Shoe produced on a 3D printer. CREDIT: MATERIALISE BELGIUM

CREATORS AND MAKERS

Something even more disruptive is now knocking at the door; 3D printing and direct digital manufacturing. We are now all familiar with the usual definition of rapid prototyping (RP), i.e. with the range of technologies and systems that are capable of transforming a digital model of an

object (a component of the shoe for example) into its physical form with a few direct and simple steps. The very name 'rapid prototyping' machine clearly indicates their original area of application, the design and prototyping department. They remained there due to the long processing time it took in the past to create the object and for the

limited number of materials they could process. Furthermore, the fragility and rigidity of the objects they were capable of creating did not permit to them to be used for anything other than aesthetical evaluation as all functional applications were precluded.

In the last ten years or so, these technologies have undergone development to bring them to a much higher level of consolidation in two major directions, the range and characteristics of the materials they can process and the reduction of the investment needed to purchase and operate them. There has also been a progressive streamlining of manufacturing techniques. What all these systems have in common though is that the final object is obtained by solidifying (adding material) with different physical or chemical processes layer after layer and bonding them all together rather than chipping off material from a block of plastic or metal using appropriate cutters (subtractive techniques).

Among the many different approaches that have so far been tested (laminated manufacturing, stereo lithography, etc.) some have survived



Configurators allow the consumer to personalise their shoes. CREDIT: MUNICH SPAIN

and are receiving constant development attention. These include selective laser sintering (SLS), fused deposition modeling (FDM) and other simpler families of machines commonly known as 3D printers. The materials that can be processed have also evolved dramatically, both with rigid materials whose strength and durability now rivals that of many materials used in shoe making and their flexibility which allows them to be considered viable alternatives for manufacturing components such as heels, technical insoles and customised outsoles. Lasts could also be targeted but, in order to become an acceptable alternative to the traditional last manufacturing process, these advanced technologies still have one important drawback, their accruing speed (the speed at which each a layer is solidified). Although this is still relative slow compared to traditional techniques, new developments are on the verge of making it much faster.

Costs have also come down and professional systems can now be bought with an investment lower than that needed for some of the more complex shoe making machines. Simpler machines, also known as 'personal fabricators', cost no more than a high quality laser printer for paper documents. All these evolutions have pushed such machines out of the prototyping world towards full production. Their designation has also changed over time and today they are no longer referred to as 'rapid prototyping' machines but rather as 'additive' or 'direct' manufacturing ones with a clear indication of the new environment in which they will be increasingly seen in the future.

The ultimate proof of their success as emerging manufacturing technologies came at the beginning of this year when two leading sport brands (Nike and New Balance) announced the first commercial models of football boots and running shoes with laser sintered outsoles tailored to the performance of the individual athlete. If we also consider other innovative experiments that those companies have recently made in the area of alternative (digital) means of producing the whole upper (knitting it rather than cutting and assembling components) or of putting together its parts by welding instead of

stitching, we should realise that we may be on the verge of a possible manufacturing paradigm shift. It is one that takes full advantage of the abundance of digital data such as 3D models of the shoes and of digital processing technologies that can directly use such data.

This is a shift that has the potential of completely reversing the roles between shoe producers and their consumers. In a futuristic scenario we could imagine consumers looking at their clothes in the closet, deciding which kind of shoes would complete the chosen outfit, searching the Internet for a shoe design company that provides the style or

model they like most, paying for the design, downloading it into their personal 'maker-bot' and printing the shoes on the spot as we do today with a document or a photograph.

In this vision of a possible future, shoe manufacturers in fact become 'design creators' and consumers the 'makers' of the products they buy and consume, quite a genetic mutation in their respective roles and a complete rearrangement of the value chain. As so many examples have already shown us, the digital invasion is unstoppable, so it might be as well for 21st century shoe producers to be prepared for such a disruptive 'singularity point'. 



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Developing the modern toe laster

DAVID HOLMES AND PHILIP LATTAWAY



Sincron TS pull-toe laster. CREDIT: MOLINA E BIANCHI SPA

Lasting involves stretching leather over a last and fastening it to an insole in such a way that it takes the shape of the last and then retains it after the last has been removed. It might therefore seem that mechanisation of the process would be easy. This would however ignore the practical problems caused by the fact that a lasting machine has to process all sizes of boot and shoe from smallest child's to largest man's, cope with different last shapes and styles, varying substances and qualities of leather and their differing ability to stretch without damage. Bearing all this in mind, it becomes easier to understand why lasting was in fact the final department in the shoe factory to be mechanised.

A TENTATIVE BEGINNING

In 1809, D.M. Randolph, an American living in London, was granted a patent to make boots and shoes by attaching a sole to the upper with rivets instead of thread. The key aspect of this patent was the use of a last with a metal bottom plate so that when the rivets were driven through the sole and lasted upper they would be clenched against it. By this means upper and sole could be firmly united.

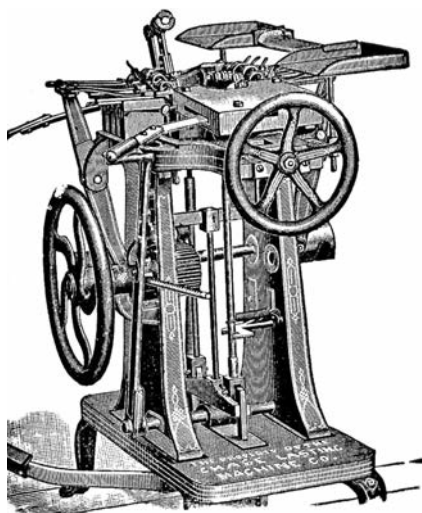
Randolph's method was developed the following year by Marc Isambard Brunel to produce boots for the Royal Navy in a purpose-built factory. This was the first boot factory to be fully mechanised and introduced the concept of division of labour. The upper was

placed on a last which was then turned bottom upwards. Clamps held the lasting margin tight to the last while the upper was pulled over by hand and stuck to the insole with paste. This was the first tentative use of a machine to stretch an upper over a last and enabled 25 men to produce 100 pairs of boots per day. The factory was nevertheless closed in 1817, its contents disappeared and traditional shoe making methods again prevailed.

In 1853 Thomas Crick, a Leicester boot and shoe manufacturer, was granted a patent that, in many ways, developed on Brunel's ideas. Crick's method made the shoe inside out on the turn shoe principle and again used rivets to attach upper to sole. The process reduced the cost of production and enabled Crick to undercut his competitors. While it forced them all to follow suit, the system had a weakness in that it was unable to process all types of leather. Although these early systems used jaws as a mechanical aid to hold the upper taut while it was pulled over the last or insole, this aspect only formed part of a single patented process.

AN IRREGULAR PROCESS

Technical effort during the 1860s and 1870s was centred on development of stitching, both for producing uppers and sole attachment. By the time engineers turned their attention to lasting, a greater range of footwear was being manufactured using a wider variety of types and grades of leather. Better standards of living had also led to greater customer expectations in regard to both fashion and quality. Lasting was already a challenge to engineers' ingenuity but changes in sole attaching technology and more complicated last shapes added new dimensions to the problem. On the other hand, the introduction of steam and, later, gas and electrical power in factories allowed them to introduce new approaches to mechanisation.



Early bed lasting machine by Chase Lasting Machine Co. CREDIT: DAVID HOLMES

Mechanisation between 1850 and 1900 was not a smooth process and four distinct stages can be identified: upper sewing (1850s-60s), sole stitching (1860s-70s), Goodyear welted process (1870s-80s) and finally lasting (1880s-90s). These extended periods were directly due to the time gap between granting of the original patent and the stage when a commercially viable machine was introduced. For example, while Elias Howe's sewing machine patent was taken out in 1846, the first machine was not installed in a shoe factory until 1852. Much development was then required during the next decade to produce a machine that overcame all problems.

The Goodyear welted process took even longer to develop. Auguste Destouy's first patent for a welt and turn-shoe sewing machine was granted in 1862 but a fully practical set of machines to produce welted shoes was not available until 1887. In the case of lasting machines, although patents were taken out as early as 1872, the first practical machine used in production—a bed laster—was not installed until 1881.

BED LASTERS

Many versions of the bed lasting machine were produced, all using the same principle. After initial hand pulling over, the shoe was placed bottom upwards in a cradle and leather clamps closed to hold it at toe and heel. Wiper plates then wiped the upper over the insole prior to inserting lasting tacks

using a 'hand tacker'. These had a raceway fed from a box at the top. When a tack had been delivered to the nozzle, it could be driven home by the operator manually using a hammer or the plunger could be activated by the operator.

In 1891 the Boston Lasting Machine Co. introduced its Boston Lasting Machine. Shoes were placed on a jack with the bottom facing upwards, the upper having previously been pulled over by hand with pincers. When the shoe was presented to the machine, the upper was wiped over the insole before the machine delivered a tack from a stationary tacking head. The jack rotated so that all parts of the shoe could be presented to the tacker head. Originally designed for flat lasting, the machine had been modified by 1897 to process welted shoes.

CONSOL LASTERS

Jan Matzeliger was granted a patent in 1883 for a Hand Method Lasting Machine, so called because it replicated the movements of manual lasting. Following a number of years of development, the Consolidated Hand Method Lasting Machine was introduced commercially in 1890. This machine, usually referred to as the 'Consol', could work on all types of leather from the lightest to the heaviest. It could also process men's, women's and children's work without requiring any adjustment.

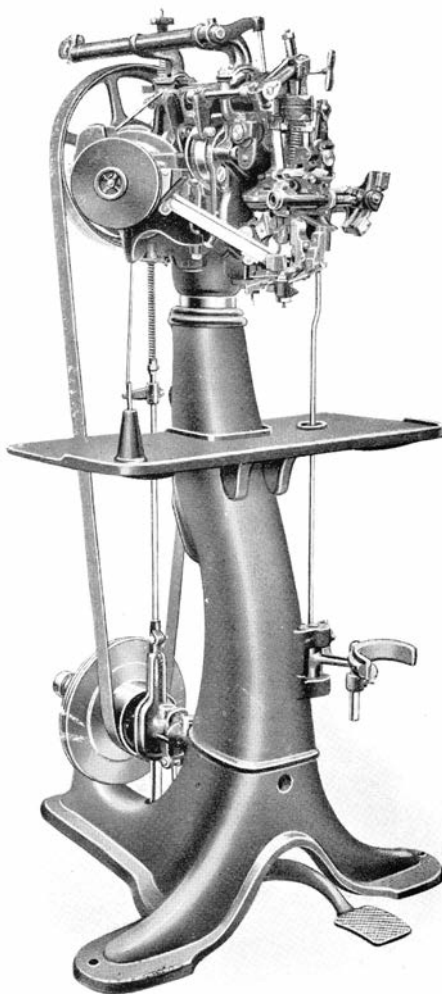
The upper having been pulled over and fastened with three or five tacks, the shoe was presented bottom upwards to the machine. The upper was drawn over by a pair of power-operated pincers and after each pull a tack was driven in to secure upper to insole. Tension was adjustable for different leathers. The pincer could also be set at any angle in relation to the side of the shoe thereby ensuring it exactly replicated the hand operation and could last all round the shoe making neat pleats at toe and seat as necessary. The Consol quickly gained international acceptance due to its versatility, ease of use and quality of finished product.

PULL-OVER MACHINES

It is strange to note that pulling over, the first operation in the lasting sequence, was the last to be mechanised. The first machine to do

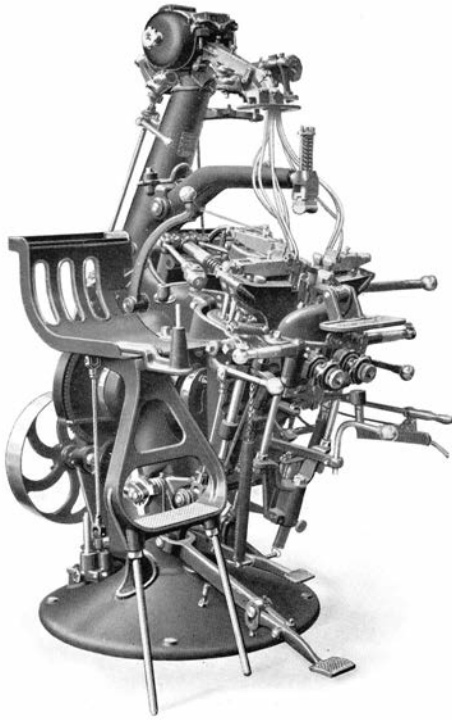
this successfully was the Consolidated Hand Method Pulling Over Machine in about 1897. The upper was placed with the toe pointing upwards and the upper outwards towards the operator. Five pairs of pincers gripped the upper, one at the toe and two at each side of the forepart. The toe pincers pulled first, with the others following closely. If the upper was not straight, it could be released and readjusted. A second depression of the treadle activated wipers and simultaneously released the pincers. The wipers then held the upper in place while the tacks were driven in.

An easier, and certainly more comfortable, machine for the operator was introduced about 1901. Using the principles of the earlier machine, the shoe was this time located with the upper facing upwards towards the operator, thus making it easier to adjust the position of caps and decoration on the vamp. Like the Consol, it could process all types and sizes of shoe and cope with all types and qualities of



Hand Method Lasting Machine (Consol).

CREDIT: DAVID HOLMES



National Pulling Over Machine.

CREDIT: DAVID HOLMES

leather. Introduction of the pulling over machine effectively completed mechanisation of the industry. By 1914, very few factories existed that did not use all the key machines introduced during the previous forty years.

CONSOLIDATION

The period between 1918 and 1939 was not one of major change in lasting technology but rather one of consolidation, with models introduced during the previous period updated and improved. Technical effort centred on increasing output and reducing the amount of labour required. Machines were also modified to cope with changes in shoe construction and design.

The focus post-1945 was one of reducing the cost of production, initially due to labour shortages and later to meet the threat from lower labour cost producers. Lasting was normally completed in four operations: pulling over followed by toe, seat and side lasting, so designers concentrated on reducing this number so that fewer operators would be required. The answer was to build a machine that would combine pulling over and toe lasting in one operation. Major developments in adhesives also now made it possible to design a machine that did not require a tack delivery mechanism and was therefore cheaper to produce.

EARLY PULL-TOE LASTERS

The first pull-toe lasters appeared at the beginning of the 1960s among which was the USM Combined Pulling and Lasting Machine. It was so successful that it became a template for all future development of this type of machine. It still required an extremely high degree of operator skill however as last and upper had to be clamped perfectly so that they were well centred and the upper then adjusted using manual controls prior to the actual lasting sequence. The lasting margins of both upper and insole were pre-cemented with neoprene adhesive which was activated by heated wiper plates and this often led to problems of the upper slipping if the dwell time was insufficient.

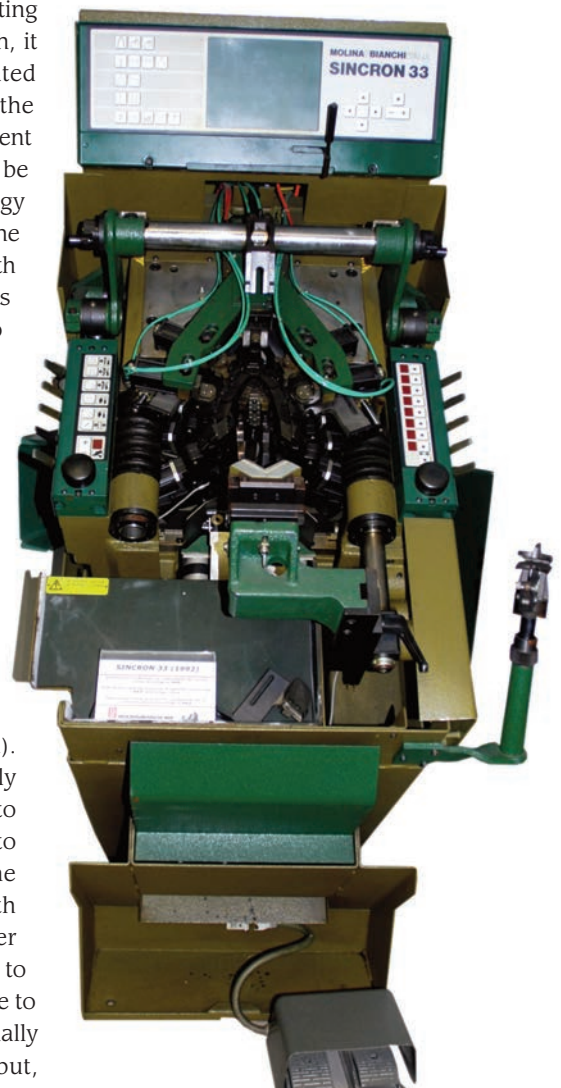
The 1970s saw a breakthrough in adhesive technology with the introduction of thermoplastic or 'hot-melt' adhesive which could be injected directly onto the insole and would then set almost immediately as the lasting margin was wiped in. To begin with, it was in granular form and heated externally before being fed to the injectors. While a great improvement on neoprene, the system proved to be expensive in terms of energy consumption and material waste. The answer came later in the decade with the introduction of rod cement. This enabled machine improvements to be made that greatly reduced both problems and also reduced the size of melting and injecting systems.

MAJOR ADVANCES

The 1980s were a time of major advances in the way machines operated, the first of which involved microprocessors. At that time, lasting machines all functioned using either pneumatic or hydraulic systems activated by telematics (remote control). Microprocessors enabled fully electronically controlled machines to be built that were faster and easier to maintain. They also led to the development of machines with simple managing computer applications that made it possible to quickly switch from one style of shoe to another without having to manually reset the machine every time but, simply, move from one pre-arranged program to another.

The other big change came about with regard to seat and side lasting machines. There were still three operations in lasting a shoe, toe, seat and sides, and manufacturers were pushing for a further reduction in order to save labour costs. Thanks to the degree of automation provided by microprocessors, a new breed of machine appeared that was able to last the seat and sides in one operation so that only two operators were now needed to last a shoe.

Advances in the management and control of lasting machines continued into the 1990s when Molina e Bianchi became the first to design and produce a pull-toe laster operated by electronic actuators. The advantage of this new concept was a machine where all the movements in the pulling and lasting cycle could be finely regulated to provide maximum precision combined with high machine efficiency. The machine was the Sincron 33 which



The ground breaking Sincron 33.

CREDIT: MOLINA E BIANCHI SPA



The first pull-toe lasters had complex manual controls. CREDIT: MOLINA E BIANCHI SPA

went on to become a blueprint for a new generation of machines, the evolution of which has continued to this day. The Sincron Zero appeared in 1997 and proved so effective that, with various improvements, it remained in production until the Sincron TS appeared in 2012.

THE LATEST TECHNOLOGY

With the Sincron TS, the managing system has taken another step forward and now uses an advanced numeric control. Above all, its main feature is flexibility in that the time needed to switch from one style of shoe to another is very brief and programmable functions are unlimited. This is all made possible by the use of a multifunction video camera which not only provides an innovative system of data identification that instantly recognises the insole profile and sends the data to the program controlling adhesive distribution, but also informs the operator.

Like many of today's footwear producing machines, particular attention has been paid to its environmental impact by the use of recyclable materials and new mechanical actuators that reduce adhesive wastage. The software has been designed to reduce energy waste by controlling the machine's hydraulics on the 'start and stop' principle to drastically reduce energy consumption when it is both operating and at rest. Seat and side lasting machines have followed the same route and the two types of machine are able to exchange data in order to follow the same lasting programs, either via wi-fi or by direct cable link.

There has also been a need to make machines as flexible as possible in order to meet the needs of shoe manufacturers forced by lower price competitors to move up-market in terms of quality and, as a consequence, to produce more styles in smaller quantities. This focus on

electronic control has seen the user interface become increasingly important, firstly through alphanumeric displays and, more recently, touch screens. Easier use and exchange of outside information has also been made possible with barcode reading, RFID and remote assistance systems. Even so, all machines still retain to varying degrees, electro-mechanical controls and functions.

Two further innovations have come from another Italian company, Cerim. The first is the use of water-based adhesive instead of hot-melt. This is currently exclusive to Cerim and covered by a patent application. It has been developed in response to the push for ever more eco-friendly materials in footwear production and, once again, to reduce energy consumption and cost. The water-based adhesive is applied cold on its K78TP machine (see also *World Footwear May/June 2013*) and therefore requires a fraction of the energy needed to melt a thermoplastic one.

The second (also exclusive and covered by a patent application) is a system to help the operator ensure consistent quality lasting even if they are not particularly skilled. Referred to as a 'calibrator', it makes a comparison between the shoe presented for lasting and a previously stored reference image in order to show the operator what the machine settings should be and how to proceed. We have indeed come a very long way from the old shoemaker sitting at his bench and lasting each shoe by hand. One wonders what he would think of today's state-of-the-art lasting machines where science has largely replaced skill but still produces a top quality result at a speed he could never have envisaged. 📡



Special injectors are used for water-based adhesive on the Cerim K78TP. CREDIT: MOLINA E BIANCHI SPA

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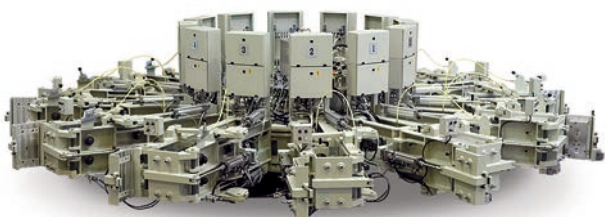


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Emma and Timothy Batten.

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Hidden dilemmas

Much of the advanced technology used by today's footwear industry has little in common with that of fifty years ago and even less with that of one hundred years back. In the current world of robotics and digital control, it is therefore both surprising and rather refreshing to find a footwear producer still using methods that have not essentially changed in over one hundred and fifty years.

Needless to say, the product involved is highly specialised and the output extremely small. It is also of the very highest quality as regards materials used, the primarily hand skills employed to produce it and the attention paid to

every detail of the finished article. It is in every sense a world away from the modern shoe factory, yet this business is now over 200 years old, has remained in the same family for all that time and intends to continue well into the future.

HORACE BATTEN (BOOTMAKER) LTD

William Batten began making boots entirely by hand in 1804. At that time even the uppers were hand-stitched and output was limited to just one pair per week because of the high work content involved. The Batten family has continued to make the very best quality riding boots ever since. Based in Northamptonshire, today's business was

established by Horace Batten in 1922. He was followed by his son Horace Lampard Batten, then his grandson Timothy, who currently runs the business with his daughter Emma, William's great, great, great, great granddaughter.

During all those years with the exception of the use of sewing machines to stitch the uppers and a few other basic items of machinery, very little has changed in the way that Batten boots are made. What has changed out of all recognition however is the rapidly changing world in which such a small business now operates and the dilemmas it faces as a consequence.

The traditional English riding boot



Figure 1 – The elegant look to a Horace Batten boot is created by the unique shape of the trees used in its manufacture.

combines strict functionality with an elegance of shape in a way that few other items of footwear ever achieve. Of key importance, the boot needs to be a good tight fit in order to support the ankle and leg in the event of a fall. The best way to achieve this is for the boots to be made to measure for each individual, as not only does this ensure a snug fit around the leg but also allows the crucial heel to throat measurement to be as tight as possible yet still allow ingress and egress of the foot. Even so, riding boots are by their very nature notoriously difficult to put on and take off. It is this element of shape that creates the first dilemma.

A SHAPE DILEMMA

Batten's small output does not need many lasts and so wooden ones often many years old are still used. Either a pair closest in size to the client's measurements is altered by adding small patches of leather called 'fittings' until the best possible fit is achieved or they can choose to have their 'own' pair made from scratch. Unlike conventional boots and shoes, riding boots also need 'trees' to give the final shape to their

legs. These are critical to the final appearance of the boots and Timothy Batten considers the special shape his grandfather developed during the 1930s is what gives a 'Horace Batten' boot its unique profile (Figure 1).

It can however create a dilemma with a client who has a more generously proportioned leg. Riding boots can of course be made for almost any size of leg, but there is no denying that a slim leg always looks best which is why women wear high heels that slim down their calves. The same therefore applies to boots and when part of a product's mystique is its elegant shape, how far is it safe to compromise that shape without damaging the product's image?

AN EXCLUSIVITY DILEMMA

The manufacture of most products generally involves an element of compromise for a variety of reasons, most often in regard to reducing costs. Batten makes only the very best quality boots. Its clientele is drawn primarily from the hunting fraternity, the military and equestrian sports such as polo and eventing. They are somewhat limited in

number and, as a pair of Batten boots can last for over thirty years (Figure 2), clients are also more likely to send a pair of boots for repair and refurbishment than order new ones.

They also appreciate real quality and derive discrete pleasure in owning a pair. Batten has responded to this by maintaining a low profile with no branding or other form of ostentation. The only way to recognise if someone is wearing a pair of Batten boots is by owning a pair yourself and knowing what to look for. Indeed, new clients are invariably the result of a friend's personal recommendation.

The problem facing a business like this is therefore whether to maintain this high but discrete reputation and wait for clients to come to you or compromise a little and become more marketing orientated in the hope this will attract a wider spread of clients and so increase revenue and output? There will always be people who will pay for the very best, especially if they perceive it as being truly exclusive. Dilute that exclusivity and there is a danger of putting at risk the very client base which forms the foundation of the business.



Figure 2 - A pair of ladies hunting boots made in 1982 that remain totally sound after thirty years of use.



Figure 3 – A bootmaker needs a range of skills that take time to learn and then hone to perfection.

A MATERIAL DILEMMA

The number of materials needed to produce a handmade riding boot is small, just upper leather, lining leather, bottoming leather, hemp for thread and assorted waxes, polishes and other general bits and pieces. Supply would therefore seem a simple exercise; it is not. The calf upper leather used is at the top end for weight and must be blemish free due to the large patterns involved. This means skins have to be specially selected and processed at the tannery. Although this makes the finished leather extremely expensive that, in itself, is not the problem.

The real difficulty is volume as although one pair of boots uses up one average skin the fact that Batten only produces a few pairs per week means that its usage is relatively tiny. Tanners require minimum quantities and the current supplier has recently announced a quadrupling of its minimum order which, while still very small by most industry standards, will nevertheless take Batten a year to consume. At the high prices involved, it will also tie up a degree of capital in proportion to turnover that would horrify any normal financial director.

The position could be eased if a lighter material was used. This though would require a much heavier calf lining to compensate and, in turn, create another supply problem. Even more important as far as Timothy Batten is concerned is that the finished boots would not be as sturdy as they are at present and also lose their shape more easily. So, despite the cost factor involved, he considers this would be a quality compromise that would not be wise.

AN EMPLOYEE DILEMMA

The small number of people involved in businesses such as Batten clearly poses a risk in cases of ill health. Most footwear producers can normally fill such gaps by transferring other employees. In Batten's case, the specialised skills involved render this next to impossible (Figure 3). Fortunately, there is a let out in that clients expect to have to wait weeks for their boots to be completed and a few extra days delay does not have the same impact that it would on a conventional supply chain.

More of a problem is that of finding people of the right skill level in the first place. While the pace of hand

shoemaking does allow a person to work on well after normal retirement age if they so wish, they will inevitably at some point have to stop and a replacement found. This creates possibly the biggest dilemma of all, whether to try to seek out someone who already has the skills needed or to start from scratch and train up a young person.

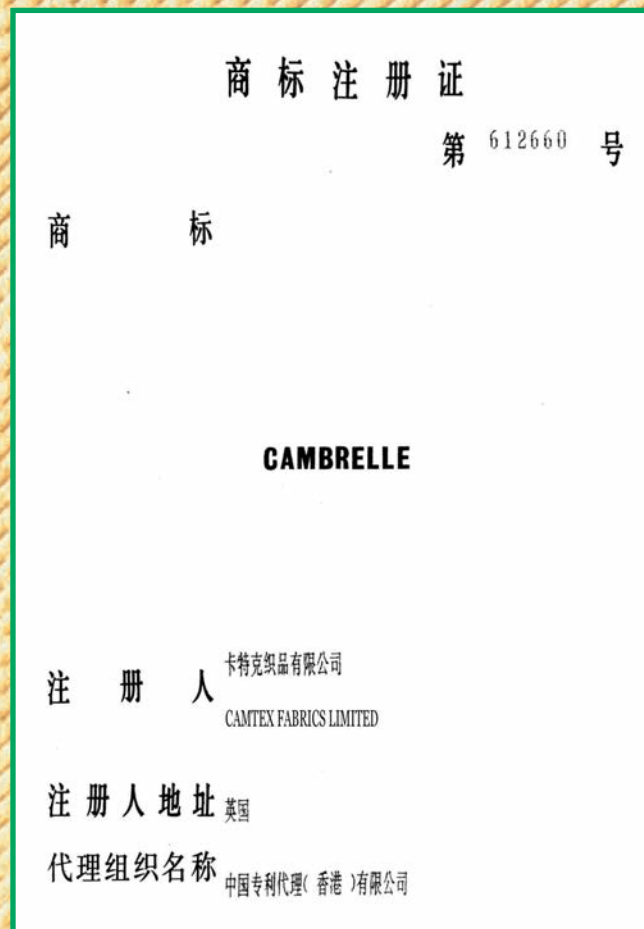
In the first instance, the pool of such people is extremely limited and it is also highly unlikely that the best would not already be in work or that their current employer would want to let them go. A Batten boot is made to the very highest standards, so only the best will do. The alternative of training up a young person would therefore seem sensible in terms of continuity.

The problem is finding suitable candidates in an age where young people have been led to expect well paid jobs from day one, rather than starting at the bottom and learning a skilled trade over time. While some may be happy to work with computer controlled shoe machinery, businesses such as Horace Batten that rely on traditional methods can appear less attractive.

A CLIENT DILEMMA

There is a further people dilemma; that of reaching a clear mutual understanding with the clients themselves as to the entire 'bespoke' process. Batten needs to know much more about a client than simply their measurements and the type of boot they want. For example, the type of horse they ride and how they ride it have a bearing on the final fit of the boots. In return, clients need to appreciate that producing their boots will take time and effort. For instance, they may not fit perfectly first time so adjustments must be made until they do.

Most clients either already appreciate this and are keen participants in the whole process of their boots' manufacture or soon become so. A good personal working relationship between supplier and customer is essential in producing a bespoke product. Clients who expect all the input to come from the other side not only make life more difficult for all concerned but are inevitably the hardest to satisfy. While there are always a few like this, the vast majority fortunately fall into the former category and so gain the most from their investment. 🍷



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Only time will tell

STEVE LEE, STEVE LEE ASSOCIATES

The past 40 years has seen the world's population almost double from 3.8 to 7.1 billion and footwear consumption almost quadruple from 5.8 to 21.9 billion pairs. The same period has also seen a dramatic shift in footwear manufacture from West to East mainly in a quest to reduce costs. It has also seen the development of a range of soling materials made from petroleum-based polymers which have helped to make this phenomenal growth in footwear manufacture possible. These include PVC (polyvinyl chloride) in the 1960s, PU (polyurethane), TPR (thermoplastic rubber) and TPU (thermoplastic polyurethane) in the 1970s, followed by EVA (ethylene vinyl acetate) in the 1980s.

It has also seen an awareness of how the demands placed by this population growth on the world's resources and its effects on the environment has grown from a few warning voices into a major consumer concern. The last 10-15 years has seen environmental soundness become a strong influence on the footwear industry, where its products have joined the general trend of needing to appear green and non-polluting. To this end most major

brands have taken a very strong position on certain materials with Nike publicly announcing that it is eliminating all PVC from its footwear. Although in its case it mainly concerns PVC coated upper materials, other companies have made similar announcements involving PVC as a soling material.

In spite of all this, PVC is global leader in materials used for footwear soling at 2,839 Ktonnes out of a grand total of all materials of 10,558 Ktonnes in 2012. The reasons are quite simple. PVC combines good wearing properties at a lower cost than the alternatives and is also easy to process using basic injection moulding technology. When we look at the data for PVC usage over the last 20 years (*Figures 1 & 2*), it is quite clear that it in fact enjoyed significant growth up to 2007. The stabilising effect of environmental pressure only appears to have kicked in over the last six years.

The downside is that it is extremely unfriendly in environmental terms in that it cannot be bio-degraded and, if incinerated, gives off highly toxic fumes and leaves a carcinogenic residue. Unfortunately, as things stand at present, there appears to be no way of

replacing the fossil fuel content with more sustainable substitutes to make a 'greener' compound. It would of course be possible to replace it by PU, TPU or TPR except that all three are in varying degrees more expensive and difficult to process. The on-going demand for low cost footwear in many parts of the world therefore makes it extremely likely that PVC will remain with us for some time to come.

HOW VIABLE ARE SUSTAINABLE ALTERNATIVES?

The move towards producing shoe soles with a stronger environmental image has been more successful with regard to PU and TPU. Whilst there have been attempts to introduce bio-based polyols into the mainstream of PU products it hasn't really taken off with footwear until the last few years when there has been a sudden flurry of activity. There are two key approaches, both focusing on the polyester polyol which makes up around 60% of a PU or TPU formulation. Several approaches have been developed for obtaining polyester polyols based on non-oil routes.

For instance, Huntsman PU in conjunction with Novomer Inc. has pursued the idea of producing a new

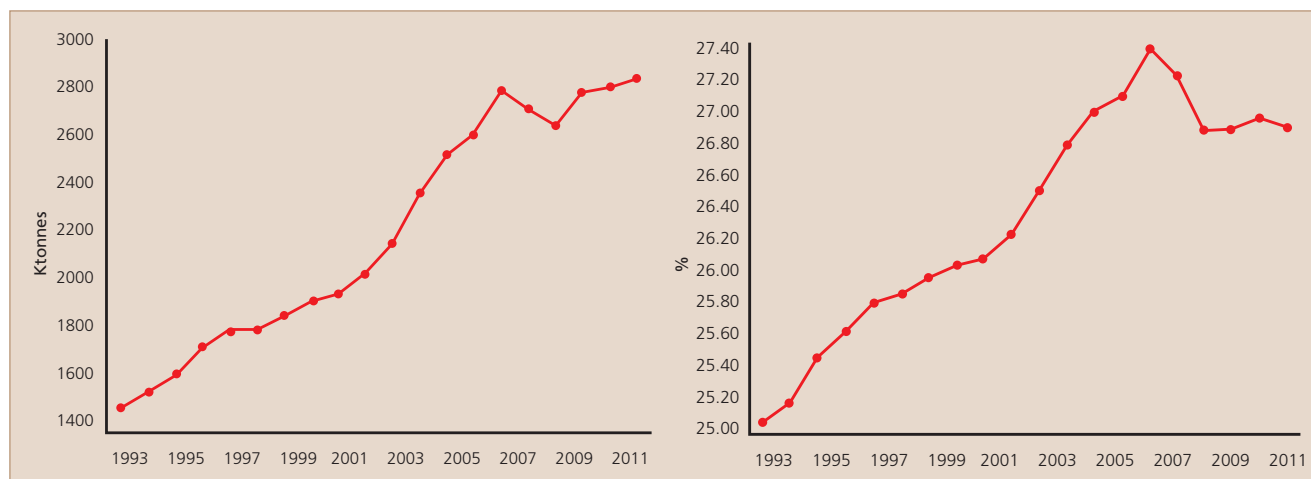


Figure 1 – Growth of PVC 1993 to 2012.

Figure 2 – PVC's percentage share of overall soling market.

class of CO₂-based polyols. These polyols increase the possibilities of developing sustainable foam alternatives for the footwear industry. Novomer has developed a unique route to high performance renewable polyols using a proprietary catalyst system which transforms waste CO₂ into polyols. This technology delivers renewable polyols that are up to 50% CO₂ by weight have a 3-9 times carbon footprint compared to existing oil-based materials and are also cost effective. Bayer MaterialScience has similarly pursued a CO₂ route to producing polyols.

Several other companies have taken a different track and developed bio-based routes to producing an alternative to Adipic acid. The one that is most advanced leads to the production of bio-based succinic acid which can then be converted into a polyester polyol using a mixture of either conventional or bio-based diols.

The leading player in this area is Reverdia, a joint venture between DSM, the life and material science company and French starch and starch derivatives manufacturer Roquette Frères, which produces the Biosuccinium brand of bio-based succinic acid (bio-SA). Reverdia has produced Biosuccinium in a 300 tonnes/year capacity demonstration plant at Roquette's site in Lestrem, France, since 2010. This facility has been used for process validation and optimisation with particular attention being paid to polymer-grade product quality. It also provides tonne-scale quantities of Biosuccinium to customers for internal testing and application development.

At the end of 2012, Reverdia started operating the world's first commercial-

scale bio-SA facility at Roquette's large bio-refinery site in Cassano Spinola, near Genoa's harbour in Italy, with a capacity of 10,000 tonnes per year. Reverdia is the only company currently employing low-pH yeast technology derived from the parent companies rather than bacteria to produce bio-SA.

Other companies are also pursuing a bio-succinic route to renewable polyester polyols include the joint venture between BioAmber and Mitsui & Co who are considering building a 17 Ktonne bio-succinic acid plant in Canada due to start production 2013/14. Piedmont Chemical recently launched renewable polyester polyols made using Susterra propanediol from DuPont Tate & Lyle Bio Products (DTL) with bio-succinic acid from Myriant Corp. 100% bio-based products. So there is clearly a great deal of intense activity on the bio-based and CO₂-based routes to the production of renewable polyester polyols that can be used in the production of PU and TPU systems for footwear soling for those manufacturers interested in establishing an environmental position.

HOW MUCH DOES IT MATTER?

How much does sustainability matter to most companies and why do they pursue it as a target? Well, a report to the recent meeting of FSK, the specialist association of foamed plastics and polyurethane, put the position rather succinctly. Dr Thomas Jostmann, Evonik Industries' head of Environment & Responsibility said "Is responsible action in chemistry just a cliché? For decades now, responsible action or 'Responsible Care' has been a *leitmotif*

of the chemical industry". Evonik now weighs the needs of society and the environment equally with those of the enterprise itself. Jostmann said the top reasons for addressing sustainability were as follows expressed in percentage terms:

- Corporate reputation 36%
- Alignment with business goals 21%
- Raising efficiency & cutting costs 19%
- Consumer expectations 19%
- New growth opportunities 17%
- Better competitive position 17%
- Leadership's personal interest 14%
- Regulatory risk 14%
- Attracting good employees 11%

Someone who is at the forefront of the quest to find sustainable alternatives, Rafael Camargo of Huntsman PU, remarks on the issue of sustainability that, "To me the success of bio-based materials, requires four factors; bio-content, performance, cost and market pull. Without these, you may have some niche applications but adoption will be limited".

On the position of sustainability, it therefore is still very early days and this will not be an easy equation to square. However, it will be very interesting to track the new opportunities offered to PU and TPU systems developers as they learn to incorporate the new renewable polyester polyols into their formulations. For instance, will polyester polyols based on bio-succinium lead to a sea-change in the production of PU footwear systems? Can they lead to lower-cost, improved processing products with the excellent properties required by the footwear industry? Only time will tell. 

The big brands are in a race to bring the latest footwear innovations to consumers and are discovering new 'concepts' along the way.

Shoe Innovations

The big sportswear brands have all launched shoes this year that they claim to be "game-changing", "revolutionary" and "the future of footwear". Nike, adidas, Puma, New Balance and Under Armour are looking to carve out niches and create concepts that did not formerly exist – "the game-changers that successfully fill a need that was there but had not been addressed yet", according to Puma's head of creative and design for footwear, Ray Horacek. He is the brains behind the company's Mobium Elite, which promises "a new way of adaptive running" – the world's first shoe that moves with the foot.

"Aesthetics are an important element on the shelf when a product finally reaches a consumer, but until then the focus of the research, concept, design and construction is about enhanced performance and breaking paradigms," he tells *World Footwear*. "A designer can't remove aesthetics from the process, it's one of the factors that is considered in every decision, but it's one of the lower priorities during much of the process as we're working through the technology."

A new dimension

The athletic footwear sector is fairly crowded at the top end, with the top few competing for marketshare and looking to outdo each other in each sport. Nike claims the lion's share in footwear, with \$13.4 billion sales in 2012, according to Transparency Market Research, followed by adidas with \$9 billion.

The US giant in February launched what it claims is the world's first 3D printed plate for an American football boot, the Nike Vapor Laser Talon (see *World Footwear*, April/May). The plate of the cleat is crafted using selective laser sintering technology (SLS), which uses high-powered lasers to fuse small particles of materials into a three-dimensional shape and which it claims has revolutionised the way it design cleats.

New Balance also tried its hand at 3D printing, customising its high-performance spiked shoes using race-simulation biomechanical data. The company is also working on softer SLS printed components that mimic the cushioning properties of foam midsoles, which should bring the customisation process to a wider customer base.

Keeping within the running sector, Germany's adidas has introduced "a new way to run" with the unveiling of its Energy Boost. Part of a new adidas segment called Energy Running, the shoe features a cushioning technology which provides "the highest energy return in the running industry", according to the company. It partnered with chemical company BASF, which created solid granular material (TPU) that is turned into



Among adidas Boost's features is an outsole that reduces wear in key areas.

PHOTO CREDITS: ADIDAS

thousands of small energy capsules which make up the footwear's midsole. "With their unique cell structure, these capsules store and unleash energy more efficiently in every stride. Tests conducted by the adidas innovation team show that the highly durable material found only in Energy Boost products provides the highest energy return in the running industry," says the company.

The team tested how the Boost foam reacted in a variety of temperatures compared with standard EVA foam commonly used in most running shoes. It says when taken from +40° to -20°C, Boost foam is three times more temperature resistant than standard EVA material, providing a more consistent run.

"Energy Boost will reset the running industry and pave the way for all future performance footwear," says Eric Liedtke, head of the company's sport performance division.





Ray Horecek, Puma's head of creative and design, took inspiration from a cat's paw for the Mobium Elite.

PHOTO CREDIT: PUMA

Cat among the pigeons

Not to be outdone, Puma in April launched what it says is the first shoe that expands and contracts with the foot. The Mobium Elite started life on the drawing board of Mr Horacek, who took inspiration from the paw of a puma. As such, the shoe has 'pads' on the sole, which expand and contract as the foot moves, offering increased cushioning.

"Re-engineering a cat's paw functionality would have been a challenge in itself, but on top of that we needed to fuse that with the expansion and contraction of the human foot," he explains. "Since no one has made a shoe that expands and contracts with your foot in this way or one with a high-tension band in the outsole, we were in completely uncharted territory during most of the design and development process. At one stage [head of research and insights] Christian Harig and I spent almost two full weeks on the floor of the factory in Vietnam just to get the basic construction working."

The Mobium band wraps around the outsole in a figure of eight and is said to enhance natural spring by working like the tendons in the foot. The 'windlass chassis' sculpted arch creates a platform for the foot in movement, helping the foot transition through the full running gait and the design encourages runners to land on their mid-foot, rather than a hard heel strike, which means less "braking action".

Mr Horacek says his inspiration comes from nature or emerging technologies and approaches. "The best ideas are always the ones you happen upon by accident. So I try to always research into areas in which I am not an expert in the hopes of discovering something new that can help us advance performance footwear."

In all, the process included research, design, prototypes of early models before prototypes of the final idea, seven sample moulds and several rounds of testing. "For every new technology on the shelf, there are at least 10 other shoes at various stages that didn't make it through the process, and the number of sketches and ideas would usually number well into the hundreds."

Keeping an eye on the competition is vital – but it's also important to keep up with innovations in all major industries, he adds. "With other brands, though, it's as much of a reference for what not to focus your time on ... especially when your goal is to come up with something truly groundbreaking."

Heel 'cups'

US-based Under Armour, better known for its apparel and taking only a modest share of global sportswear sales, has made a play for the big boys with its soon-to-be launched SpeedForm concept. It says they are the first shoes that have not been made in a footwear factory; instead they are manufactured at one of its clothing suppliers – specifically, a bra factory in China – and are said to have the same "genetic make-up" as a bra.

The company has big ambitions: it launched its first footwear range in 2006, grew the sector to \$127 million in 2011 and expects to reach \$290 million by the end of this year – an impressive annual growth rate of 44%. Propelled by the SpeedForm range, it predicts footwear revenues will double by 2016 to \$300 billion – by which stage it is hoping to be in the top three running shoe makers globally.

"When we look at the landscape in 2013, I think the most important thing is that we've learned what it means to truly be a footwear company, not an apparel brand who's making shoes, but a totally integrated footwear company," says its CEO Kevin Plank. "And you haven't seen anything yet. We are truly just getting started."

The company spent three years trying to come up with a completely new way of making shoes when it hit upon the



Puma's Mobium, based on a cat's paw, moves with the foot.

PHOTO CREDIT: PUMA

Footwear sales in millions

Company	Fiscal 2010	Fiscal 2011	Fiscal 2012	Growth Rate (2010-12)
Nike	\$10,301	\$11,518	\$13,426	14.2%
adidas Group (includes Reebok)	\$7,021	\$8,132	\$9,018	13.3%
Puma	\$1,856	\$2,006	\$2,078	5.8%
Under Armour	\$127	\$182	\$239	36.6%

Source: Transparency Market Research.

SpeedForm idea. It looked at how cycling apparel and rock climbing kit fit the body in the most snug way – and the “stars aligned” when contemplating the NASA space suit, according to head of creative design Dave Dombrow. He took inspiration from the fact that lingerie group Playtex won the contract to make the spacesuits, as they had knowledge of the body and fit—which is when he thought of using a bra supplier.

Made from a similar padded material to a bra, the SpeedForms are produced from a single piece of seamless material and are devoid of stitching. They mould themselves around the foot with the premise that the closer the fit, the faster the wearer will run. “Nothing has ever fit like this, I promise. It couldn’t, it’s never been done,” says Mr Dombrow.

With marketing still to be finalised, the company hadn’t released any photography at the time of going to press, but a

big launch is expected towards the end of the summer.

Last year, when Nike and adidas went head to head with knitted shoes – for Nike the Flyknit and adidas the Primeknit, both claiming to be world firsts and three years in development and then launching within weeks of each other – industry observers mulled the implications for the wider industry. By making the upper from a single piece of material on a loom, they could perhaps sideline factory workers and create an argument for nearshoring, or bringing manufacturing nearer to brands’ headquarters. Although they might not have taken off in the way the companies would have liked (perhaps due to Nike suing adidas for copyright infringement), the Under Armour innovation could also make manufacturers take note. “We stumbled upon something bigger than a shoe – it’s a new way of manufacturing,” concludes Mr Dombrow. “It’s a big, big, big deal.”

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Kobi Levi was one of eight artists commissioned to use their own artisan skills to mark Cremona's inclusion on the UNESCO Intangible Cultural Heritage of Humanity list.

PHOTO CREDIT: KOBI LEVI



Cremona's creativity commemorated in Kobi Levi shoes

Traditional violin craftsmanship in Cremona in northern Italy was one of 16 cultural activities around the world to win inclusion on the list kept by the United Nations Educational, Scientific and Cultural Organization (UNESCO) of the brilliantly named "Intangible Cultural Heritage of Humanity" in 2012.

To mark the occasion, Cremona commissioned eight artists from all over the world to create objects commemorating the city's tradition of making stringed instruments, which dates back to at least the sixteenth century. One of the artists who took part was flamboyant Israeli footwear designer Kobi Levi

Israeli footwear creator Kobi Levi was one of eight artists commissioned by the city of Cremona to mark a moment of great significance in the history of the city and its artisan traditions.

and the shoes he made are part of an exhibition of the commissioned artists' work, which will run in Cremona's Ala Ponzone museum until September 29 this year.



The city of Cremona believes its instrument making craft is a fundamental part of its culture and its identity.

PHOTO CREDIT: UNESCO

Cremona craftsmanship

Cremonese violin makers attend a special school, based on a close teacher-pupil relationship, before being apprenticed in a local workshop, where they continue to perfect their technique, which they acknowledge to be a never-ending process. Each violin maker constructs between three and six instruments per year, shaping and assembling more than 70 pieces of wood around an inner mould by hand, according to the different acoustic response of each piece. No two violins are alike. Every part of the instrument

is made with a specific wood, carefully selected and naturally well seasoned. No semi-industrial or industrial materials are used.

Craftsmanship requires a high level of creativity, the authorities in Cremona say. The craftsman has to "adapt general rules and personal knowledge" to every instrument. Cremonese violin makers are deeply convinced that sharing their knowledge is fundamental to the growth of their craftsmanship, and dialogue with musicians is deemed essential so as to understand their needs. Traditional violin-making is promoted by two associations, the Consorzio Liutai Antonio Stradivari (more on whom later) and the Associazione Liutaria Italiana. This beautiful craft is considered "fundamental to the identity of Cremona and its citizens", and plays a key role in the community's social and cultural life.

Kobi Levi says it with shoes

Kobi Levi believes there are parallels between the art of making shoes the way he does and the traditional art of stringed-instrument production in Cremona that UNESCO has now honoured. For example, it is exceptionally interesting that the instrument makers choose specific woods for specific instruments, and also that the craftsman or woman has to adapt the rules and use personal knowledge to make each instrument, meaning that no two instruments are the same. Mr Levi's shoes are all handmade. Each part is made specifically for the pair it is intended to be used in. Therefore, like the instruments, no two pairs of his shoes are exactly the same either. And shoemaking also has its "general rules" to make sure each shoe is strong and

Violin elements in the design include waxed threads at the back of the shoe to represent the strings, F-holes cut into the midsole, a decorative toe reinforcement and a leather ankle-support strap that curls out from the back of the upper like a violin's scroll.

PHOTO CREDIT: KOBI LEVI

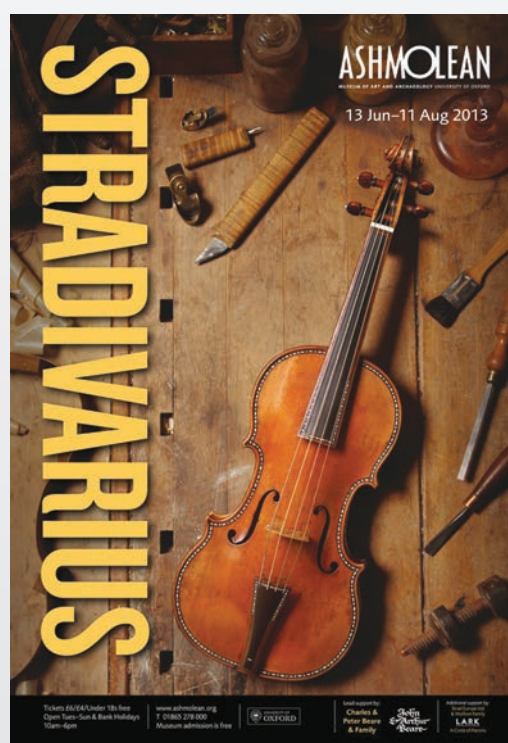


SPECIAL SOUND OF STRADIVARIUS

In parallel with the Cremona exhibition that features Kobi Levi's Violin Shoe, a separate celebration of Cremonese craftsmanship has been on show since mid-June at the Ashmolean Museum in Oxford. The Oxford Exhibition, which runs until August 11, celebrates the life and work of Cremona's most famous violin maker, Antonio Stradivari by bringing together 21 of his most important instruments to showcase the brilliance of his craft. Some 500 Stradivarius instruments remain around the world.

Most of the instruments in the Oxford collection come from Stradivari's so-called 'Golden Period', from 1700 to 1720. The experimentation that violin makers still employ in Cremona today and that Kobi Levi adopts to make his shoes, was an important part of what made Stradivari special, according to the curator of the Ashmolean, Dr Jon Whiteley.

"With each instrument he tried to experiment with a different balance between responsiveness, carrying power and expression," Dr Whiteley told the BBC when the exhibition opened. "In about 1700, he made a smaller instrument that swelled out more in the back and the front so that the sound-box contained a larger volume of air. And through tweaking it, and through trial and error, he reached a point at which the instruments were making a sound that matched what he heard in his ear and also had a carrying power that made them the ideal instrument for playing, say, in concert halls. The sounds [of a Stradivarius violin] fly heavenwards with an ease and a perfection and a sense of expression almost unparalleled."



CREDIT: ASHMOLEAN MUSEUM IN OXFORD.

Dr Whiteley calls "absolute nonsense" claims that Stradivarius was simply lucky to stumble upon the right wood, the spruce around Cremona, at the right time, and so produce his special sound. "Every other violin maker in Cremona had access to the same wood," he says. "That made no difference."

Instead, he says Stradivarius had the reputation of being an alchemist, someone who could turn lead into gold. "He used the same materials as everyone else but made an instrument that is perfect as a piece of craft," he concludes.

durable enough to wear and to make sure it will fit a real foot. "The creative work involves transformation and innovation regarding these rules," Kobi Levi says.

In the case of his Cremona commission, violin elements on the 12-centimetre-heeled shoes Kobi Levi created for the occasion include two parallel F-holes cut into the inside and outside of the midsole and a decorative toe reinforcement in the shape of the instrument's tailpiece. A leather ankle-support strap that curls out from the back of the upper is reminiscent of a violin's scroll and four 'strings' made from wax thread stretch between the the back of the 'scroll', down over the heel part of the upper, and across a space between the heel itself and the upper, to attach to a mini-bridge at the back of heel-base. The insole itself is shaped like the silhouette of a violin, with the upper following it. The upper and heel cover are made from calf and goat leather, and the heel is carved in wood.

Untouchable

Shoes, wood, leather and wax thread are all tangible things, but so are violins and the other stringed instruments that the craftsmen and women of Cremona make. What UNESCO has honoured the city in Lombardy for is its intangible cultural heritage.

The committee that made the decision to include Cremona on UNESCO's representative list of wonderful examples of intangible cultural heritage explained its reasons by saying: "Traditional craftsmanship for violin-making has been transmitted from generation to generation, both through apprenticeship and through formal education, playing an important role in the everyday life of people in Cremona and giving them a sense of identity." Kobi Levi's work of art aside, perhaps it's the intangible rather than the tangible aspects that link Cremonese craftsmanship in violins to the heritage and traditions of artisan shoemakers around the world. 🌀

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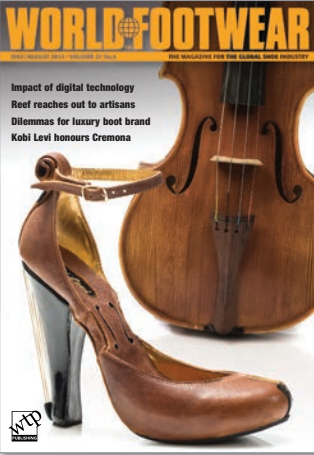
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