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THE MAGAZINE

FOOTWEAR INDUSTRY



Mixed fortunes for leather
Stronger insoles for high heels
Footwear at ISPO 2017
Inside the Lighthouse

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Men's shoes from Allen Edmonds, the famous US brand recently acquired by Caleres.

Image: Allen Edmonds

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News

NETHERLANDS Footwear research and education institute SLEM is preparing a new event in its seminar series, with this one taking place in Waalwijk, on April 20 and 21. The first day will focus on “smart manufacturing” and the second on “disruptive manufacturing”.

FRANCE French industry association the Conseil National du Cuir (CNC) confirmed that footwear exports from France rose by 7% in value in the first nine months of 2016. Between January and September 2016, French shoe manufacturers exported products worth more than €2.2 billion.

ITALY The 87th edition of Expo Riva Schuh in January, had 13,024 visitors attending the event at Riva del Garda in northern Italy, which the organisers said was “in line” with the January 2016 edition. There were 1,449 exhibitors from more than 40 countries.

● Asset management company Carlyle Europe Partners has confirmed that it had reached an agreement to acquire Venice-based footwear brand Golden Goose. It mentioned no price for the deal but business media, including the *Financial Times*, have said it values the Italian brand at €400 million.

UK Liverpool-based medical device specialist Algeos donated insoles and orthotics to all 13 of the UK’s podiatry colleges. Jackie Fisher, who took over as the company’s chief executive during 2016, said the move came from Algeos’s commitment to invest in the “continuing professional development of the professionals on the frontline”.

● UK-based luxury brand Jimmy Choo recorded sales of £364 million in 2016, a 14.5% increase year-on-year. At constant exchange rates, this was growth of 2%.

SPAIN President of the Valencian region’s main shoe industry association, Avelal, Marián Cano, said her 220 member companies are worried that exports fell in 2016 for the first time since 2008, but that there is no need for “alarm”.

PERU Groups representing shoe manufacturers in Peru said footwear producers there have suffered an 80% decline in sales in 2016 as a result of imported shoes from Asia gaining an ever-greater market share.

SERBIA The authorities in the city of Sremska Mitrovica in northern Serbia revealed that Italian footwear manufacturer East West is to open a new factory there. Mayor Vladimir Sanader told local media that the East West facility will begin production in autumn this year.

CHINA The Nike-owned Jordan brand, named after American basketball legend Michael Jordan, is to open its largest store in Asia to mark the 20th anniversary of entering the Chinese market.

ETHIOPIA The country’s Leather Industry Development Institute (TIDI) is working closely with the government-backed Made By Ethiopia initiative to promote the country’s leather and footwear industries to potential international partners.

● The Italian government signed an agreement with the United Nations Industrial Development Organization (UNIDO) to fund the second part of a programme to help small and micro-businesses in the footwear and leathersgoods sectors in Ethiopia.

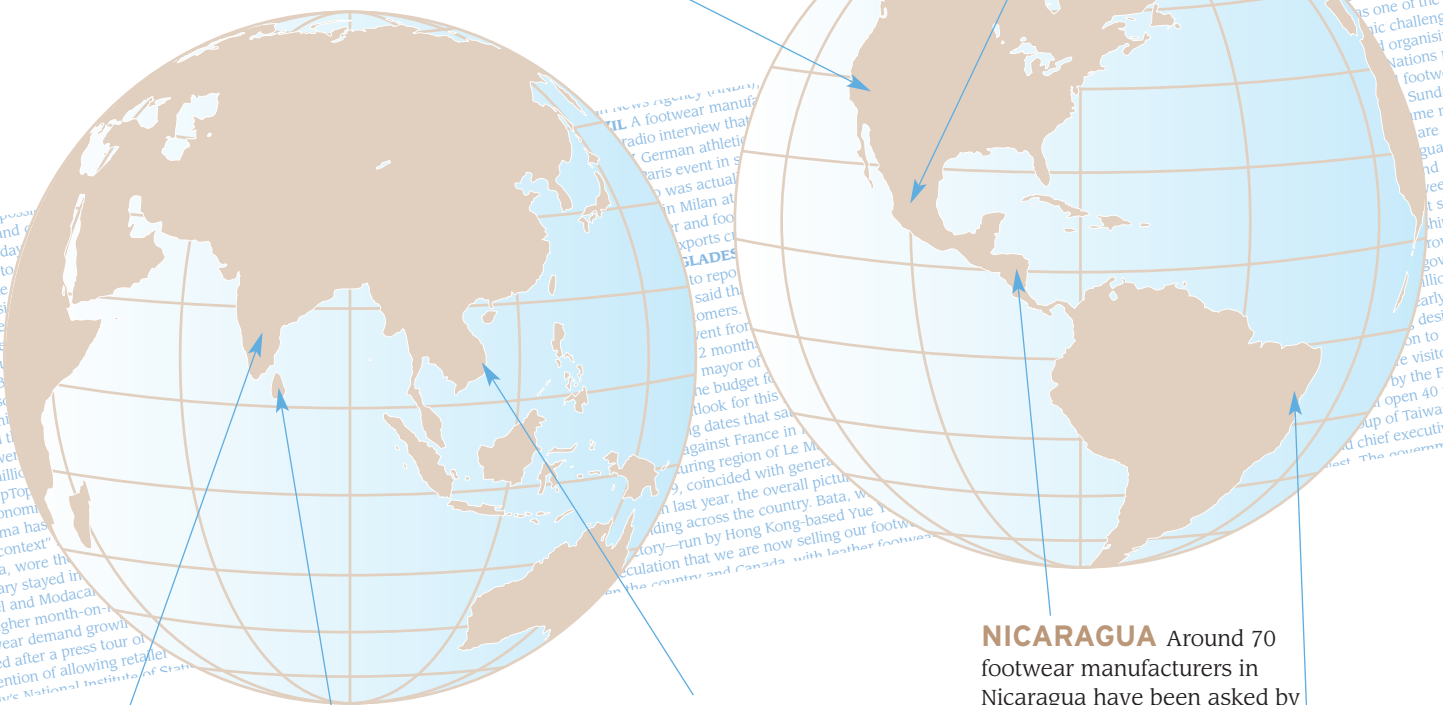
US The US athletic footwear industry generated \$17.5 billion in 2016, a 3% year-on-year growth, according to the latest report from specialist research group NPD. Despite growth in the first three quarters of the year, the industry saw a slight decline in the fourth quarter.

- Sports brand Under Armour recorded revenue of \$4.8 billion in 2016, a 22% increase on the previous year, driven by strong performance in its footwear and women's businesses. Its footwear sales topped \$1 billion across the 12 months.

- Thread manufacturer American & Efird (A&E) launched a new reflective, specialty industrial sewing thread for use in footwear and other applications. The new product is called Anefil Reflector.

- Footwear group Steve Madden announced the acquisition of US footwear business Schwartz & Benjamin, which specialises in private shoe labels and wholesale sales. The value of the deal was not disclosed.

MEXICO The CICEG footwear industry association in the Mexican state of Guanajuato announced plans to establish a new research and development centre for footwear in the region. The facility will serve to give small- and medium-sized companies in Guanajuato access to the latest technological advances in footwear manufacturing.



INDIA Council for Leather Exports chairman for northern India, RK Jalan, said the organisation now calculates the country's annual average footwear consumption as 3.71 pairs per person. With India's population currently at more than 1.3 billion, this would mean total domestic footwear consumption of close to 5 billion pairs.

- Indian footwear manufacturers brought in export revenues of more than \$2.7 billion in financial year 2015-2016. This figure represents a decline year-on-year of 7%.

SRI LANKA Exports of footwear and leather from Sri Lanka increased 28% in 2016, according to the country's Minister of Industry and Commerce Rishad Bathiudeen. He said the Sri Lankan government is planning to establish a footwear and leather industry city in the country's Eastern Province.

VIETNAM Paiho Group, a Taiwanese manufacturer footwear of accessories including shoes laces, elastic tapes and hook-and-loop systems, is to set up a manufacturing facility in Vietnam. It will invest \$50 million in the plant, which will be managed by its Vietnamese subsidiary, Paiho Shih Holdings.

- Testing and certification body SGS opened a new consumer product testing laboratory in Hai Phong, in the north of Vietnam. The new laboratory has the facilities to provide physical and restricted substance testing for a range of products, including footwear and textiles.

BRAZIL Over the course of 2016, Brazilian footwear companies exported 126 million pairs of shoes for a total value of \$999 million. This represented respective increases of 1.7% and 4% compared to the previous year.

- The 2017 edition of the Couromoda footwear exhibition (January 15-18 in São Paulo) attracted nearly 35 million visitors, according to the organisers of the event.

- Brazilian shoe manufacturer Usaflex is to build two new footwear factories in the Vale do Sinos region of the state of Rio Grande do Sul. The company said each of the new facilities will employ 1,000 people, creating 2,000 new jobs in total.

NICARAGUA Around 70 footwear manufacturers in Nicaragua have been asked by industry association Camcunic to turn their hands to making athletic footwear. So far, the shoe manufacturing companies, most of them very small, have received training from Camcunic on athletic shoe construction, materials and market information, and a number of them have started to make samples.



Footprints

FDRA DISAPPOINTED AT TPP WITHDRAWAL

US President **Donald Trump** formally signed an executive order to withdraw the US from the Trans-Pacific Partnership (TPP) free-trade agreement.

A final proposal for the 12-nation deal was signed on February 4, 2016 in New Zealand but cannot be ratified without the approval of all participating nations. It aimed to strengthen economic ties and boost growth by eliminating trade tariffs between the countries.

In a statement following the decision, the president and CEO of the Footwear Distributors and Retailers of America (FDRA), **Matt Priest**, said the organisation was "extremely disappointed".

He described TPP as a "significant lost opportunity for American footwear consumers and businesses", revealing that the FDRA believes the agreement would have helped US footwear companies and consumers to save more than half a billion dollars a year.

ACICAM RUES IMPACT OF IMPORTED CHINESE GOODS

The president of Colombia's main leather and footwear industry body, Acicam, said that the company's leather and footwear companies are being hit hard by imports of cheaper products from China.

Luis Gustavo Flórez made the comments in an interview with specialist online media organisation *Modaes*. He said that imports from Asia have "directly impacted" Colombia's footwear and leather sectors, describing them as "a large obstacle" to growth. He called for an increase in customs controls, especially for products coming from Asia, as well as from Panama.

Mr Flórez said companies also need to work on improving their competitiveness and productivity. He highlighted the creation of a new programme to this end, which has seen Acicam establish partnerships with Colombian companies to help them boost their productivity.

He also urged Colombian footwear companies to diversify their export destinations, given that two of its primary



WF STRENGTHENS COMMERCIAL TEAM

Jo Tait has joined World Trades Publishing as Global Sales Manager for *World Footwear* and its sister publication *WSA* that concentrates on world sports activewear and technical textiles. Her responsibilities also include the further development of WTP's associated websites. Ms Tait brings a wealth of experience to the team, having worked on trade publications and b2b promotion for 18 years. **Simon Yarwood**, WTP's publisher and CEO, said: "Jo is able to bring new opportunities for our readers and advertisers, using her experience from outside our immediate industry sectors, and they can look forward to fresh initiatives designed to develop their interests."

markets, Venezuela and Ecuador, are suffering economic difficulties.

He admitted that Colombia's footwear exports remain "fairly modest", at approximately two million pairs each year. To improve this, Acicam is aiming to develop a strategy for increasing its sales to the US, as well as other Latin and Central

NEW RECRUITS FOR FAYTEX

Specialist developer of synthetic moisture management materials for footwear **Faytex** has added two new people to its team.

Andy Simonds joined as **Faytex's** new director of global sales after almost 20 years in the footwear industry, mostly in product marketing and brand building roles at brands including Saucony and New Balance. Mr Simonds also has experience of specialist healthcare footwear products, as well as of start-ups and turnaround opportunities.

Before working in footwear, he spent ten years as a competitor and coach in alpine skiing and also worked for trade body Snow Industries America.

In parallel, **Faytex** recruited **Kelly O'Neil Knight** to its sales and marketing team. She comes to the company with a background in education and healthcare.

ALPARGATAS ARGENTINA LOSES CEO AMID CLOSURES

The CEO of the Argentinian branch of casual footwear manufacturer **Alpargatas**, **Javier Goñi**, stepped down from his position in February.

He had been in charge of the Brazilian's group activities in Argentina since 2008 but is leaving due to personal reasons, according to the company. His replacement was named as **Diego Mohadeb**, who has been employed at the company in various capacities since 2009.

Alpargatas announced in January that it had been forced to close two of its factories in Argentina. The facilities in Buenos Aires and San Luis primarily manufactured shoes for the **Topper**, **Rueda** and **Mizuno** brands. The closures resulted in the loss of 170 jobs.

OBOZ LOOKS TO BOOST BRAND PRESENCE

Outdoor footwear company **Oboz** based in Montana has formed a new marketing team in an attempt to further build its brand presence in the footwear market.

It promoted **Christian Mason** to the position of vice president of sales and marketing. He joined **Oboz** in 2014 and has experience managing its independent sales force, as well as building relationships with key retailers.

Steve Lowry will take on the role of sales and marketing coordinator. This

newly-created position encompasses a wide variety of duties and projects, including coordinating communications with sales teams, managing sales promotions and professional purchase programmes, and overseeing digital marketing management. He will also plan sales meetings and trade shows.

UGG RECRUITS DESIGNER FOR NEW COLLECTION

Deckers-owned footwear brand Ugg collaborated with US fashion designer **Phillip Lim** on a new range of men's footwear.

Mr Lim served as creative director for the limited-edition capsule collection, which includes four different styles of Ugg's Classic boots for men – the Classic High, Classic Short, Outdoor High and Outdoor Short.

"Phillip Lim brings a fresh perspective to our men's line, reimagining our iconic styles in a new way. This collection reflects his thoughtful craftsmanship in artful stitching and precise detail," said **Andrea O'Donnell**, Ugg brand president.

TEXON APPOINTS NEW CHIEF OPERATING OFFICER

Supplier of materials for footwear insoles and linings Texon named **Jelle Tolsma** as its new chief operating officer.

Mr Tolsma moved to Hong Kong to take up his new position in November after a career in fast moving consumer goods, more than 15 of them at Cereal Partners Worldwide, a joint-venture between Nestlé and General Mills.

"Jelle will bring drive and experience as we pursue our goal of growing our business substantially and creating long-term growth," Texon stated on announcing the appointment.

WOLVERINE SNAPS UP INDUSTRY VETERAN

Outdoor footwear group Wolverine appointed **Todd Spaletto** as president of its Outdoor and Lifestyle division.

In February 2016, the group announced a new group structure for its brands, which saw them split into three segments: Wolverine Outdoor and Lifestyle Group, Wolverine Boston Group and Wolverine Heritage Group.

The Outdoor and Lifestyle group is made up of the Merrell, Chaco, Cat



NEW MANAGING DIRECTOR FOR PO-ZU

London-based footwear brand Po-Zu appointed **Safia Minney** as its new managing director to work alongside founder and chief executive, **Sven Segal**.

Po-Zu launched in 2006 and has won recognition for its ethical approach to business. It gives 3% of sales revenues to environmental

charities, sources natural materials that include organic cotton and piñatex and has a commitment to using renewable energy.

Safia Minney founded a fashion company called People Tree and led it for 24 years, developing a reputation as a champion of partnerships in sustainability and fair trade. She stepped down from that role in November 2015 and spent her time between then and taking up her new role at Po-Zu doing some consultancy and writing a book called 'Slave To Fashion', which will be published in March 2017.

One of the first projects the new managing director is working on is a collection Po-Zu is preparing to launch jointly with the Star Wars franchise, which will include replicas of the inter-galactic footwear worn in the films by some of the key characters. The shoes are being made by outsource manufacturing partners in Portugal and will be available to the public from August this year.

Footwear, Hush Puppies and Sebago brands. It was initially headed by **Jim Zwiers**, but he has now been promoted to the newly-created position of executive vice president of the company.

Mr Spaletto, an industry veteran with extensive experience in branded apparel and footwear, most recently served as president of VF-owned The North Face. He will be responsible for leading the growth of Wolverine's outdoor and lifestyle brands.

ROCKY BRANDS ENDS SEARCH FOR CEO

Footwear group Rocky Brands named **Mike Brooks** as its new CEO. He had been acting CEO since September last year, following the resignation of **David Sharp**.

The company's board of directors had been searching externally for his replacement, but this search has now been suspended.

"Since coming back to serve as interim chief executive officer in early September, I have been re-energised by the skills and devotion of our associates to design, manufacture and deliver quality footwear to our customers," Mr Brooks said.

"As we bring a close to what has been a difficult year, I believe that we are laying the groundwork for improved

performance in 2017 and beyond and I look forward to working with the entire Rocky Brands team in 2017," he added.

ELITE ATHLETES ON BOARD WITH HOKA ONE ONE

Deckers-owned Hoka One One has put together a team of world-class trail and road runners, track athletes and triathletes, who will serve as global ambassadors for the brand.

The group, which it has dubbed the Evo Time to Fly elite team, includes Olympic marathoner and ultra-runner **Magdalena Boulet**; Olympic 1,500-metre silver medallist **Leo Manzano**; French national champion triathlete **Charlotte Morel**; and Ironman champion **Heather Jackson**.

"The Evo Time to Fly team features some of the best international athletes in every discipline of running - road, trail and track," said **Mike McManus**, Hoka One One's global sports marketing manager. "We've carefully selected athletes that continually challenge the status quo and proudly represent our brand as ambassadors who inspire others."

The athletes will work closely with the brand's product development team as well as its innovation centre, known as the Evo Lab, to help design and test new running and racing shoes. 🏃



Products & Services

GDS SHOW IS REPLACED BY 'GALLERY SHOES'

Following an announcement in January that the recent February edition of the GDS Footwear Exhibition would be its last, the organisers of the event which will replace it have unveiled more details about the new concept.

Messe Düsseldorf said in January that GDS is no longer "the right format for the current challenges within the shoe sector".

The new event will be called Gallery SHOES, with the first edition taking place from August 27 to 29 at the Areal Böhler estate in Düsseldorf. This information was revealed at the opening press conference of GDS by tradeshow organiser the Igedo Company, which has taken over responsibility for the event from Messe Düsseldorf.

"Just continuing GDS with a different framework simply makes no sense," explained Philipp Kronen, managing partner of the Igedo Company. "Everything has to be completely thought out again across all levels."

The summer edition of GDS typically took place in July, but the Igedo Company has decided to shift Gallery SHOES to around a month later. It will now also take place from Sunday to Tuesday, with the aim of attracting independent specialist shoe retailers.

The organisers said the new show will focus on the "significant exhibitors" in the European footwear industry, with exhibitors from Germany, Italy, Spain, Portugal, France and the Netherlands expected to attend. They are targeting a 65% share of international exhibitors.

UPACO ADHESIVE WILL WORK ON "VIRTUALLY ALL" FOOTWEAR MATERIALS

Industrial adhesives and coatings manufacturer UPACO said a film it developed initially for polyurethane soles is now applicable to "virtually all footwear materials and constructions".

New Hampshire-based UPACO, part of Worthen Industries, developed the product, EcoBond Film 1003, for in-mould application to poured or injected polyurethane soles. The film is

emission-free, safe to store, non-flammable, easy to use and produces no hazardous waste, the company explained, adding that it also has adhesion properties equal to or more effective than traditional processes.

The company has gone on to develop a second-generation product, Film 2609, which can be used to cement rubber to co-moulded EVA.

UPACO said that, although it believed from the outset that its technology was "better for customers and for the environment", it was more expensive than traditional solutions and the company had to work hard to convince customers they would receive a quick return on the extra investment.

LABEL TELLS CANADIAN CONSUMERS HOW SLIP-RESISTANT SHOES ARE

Researchers in Toronto have developed a new method for testing the effectiveness of slip-resistant footwear on icy surfaces.

A team at the Toronto Rehabilitation Institute asked members of the public to take part in the study, inviting them to try out different footwear technologies in conditions designed to mimic inclined, wet and icy surfaces. From this, it came up with the new testing method, which the institute has called the Maximum Achievable Angle (MAA) method.

In the tests, it tipped the platform people were walking on until they slipped (safety harnesses made sure there were no injuries) and developed a consumer-facing label, giving boots and shoes a rating of zero, one, two or three snowflakes, to show how well the footwear will cope on slippery, sloping roads and pavements. If the soles start slipping at between seven and ten degrees, the rating is one snowflake. Eleven to 14 degrees gives two snowflakes and anything above 15 degrees gives a maximum three-snowflake score.

Research director, Dr Geoff Fernie, said he expects "serious and life-changing injuries" to be prevented this winter by people choosing to buy

better non-slip footwear as a result of this study.

In total, participants tested 98 different styles of slip-resistant winter boots. Only 8% of these met minimum slip-resistance requirements laid out in the MAA method and earned a one-snowflake rating. No footwear product achieved a rating higher than one snowflake. All the boots and shoes tested were brand new; the institute has pointed out that wear on the soles will, obviously, make slip-resistant technology less effective.

Boots from WindRiver, Sperry, Cat Footwear, Wolverine and Dakota managed to achieve a one-snowflake rating. A Sperry men's Cold Bay boot came top with a score of ten (degrees) for walking up or down on bare ice. It uses Arctic Grip soling technology from Vibram.

NEW OEKO-TEX STANDARD APPLIES TO SHOES TOO

The new leather standard launched late last year by independent textile research and testing organisation the Oeko-Tex Association applies to shoes too. The secretary general of Oeko-Tex, Georg Dieners, confirmed shoes' inclusion during a talk to present the new standard at a leather industry seminar organised by chemicals manufacturer Lanxess in mid-January.

Mr Dieners explained that detailed discussions had taken place inside the Oeko-Tex organisation about this question because shoes are already covered by the Swiss body's established Standard 100 certification. "We discussed this for a long time," he said, "but shoes are in the scope of the leather standard."

He explained that shoes with more than 50% leather content will be certified under the Oeko-Tex leather standard, whereas shoes with less than 50% leather content will continue to be certified under Standard 100. However, the leather components of those shoes will be tested according to the leather standard and he made it clear that a product could fail its Standard 100 certification if the leather component



ADIDAS DESIGNS SHOE TAILORED FOR WOMEN

Sports brand adidas unveiled a version of its Ultra Boost shoe specifically tailored to the needs of female runners.

The Ultra Boost X was made to form to the shape of the female foot. It was designed using adidas's Aramis motion-capture technology, which allowed the brand to identify where women need the most support when running.

The shoe has a free-floating arch to offer greater stability. It also has an open toe design for breathability and a full-length Boost midsole to maximise energy return. An innovative lacing system has been devised to support quick-fire movements and the Stretchweb outsole has been specifically designed for the female gait.

does not meet the requirements of the leather standard. "All parts of an article have to meet the criteria that apply to them," Mr Dieners said.

UNDER ARMOUR EXPANDS 'SMART' SHOE PORTFOLIO

Sports brand Under Armour announced the release of three new 'smart' running shoes for 2017.

The brand unveiled its first smart shoe, SpeedForm Gemini 2, at the start of 2016 as part of its debut Connected Fitness product portfolio.

The three new shoes – the SpeedForm Gemini 3, SpeedForm Velociti, and SpeedForm Europa – feature Under Armour's Record Equipped technology. It is a smart feature integrated into the footwear that allows the wearer to track and store data related to their workout. This includes speed, duration and distance.

A new feature, which the brand calls Jump Test, detects the average amount of time a runner's foot is in the air to give an indication of muscle fatigue. This data can be used to advise the wearer on how to alter the intensity of their workout and to help them tailor their recovery regime.

Footwear has been a key driver of growth for the brand. It says it plans to more than double the number of units of Connected Footwear it sells

worldwide this year. This will include global distribution to North America, Europe, the Middle East, Australia, New Zealand, Japan, and China.

MICHELIN EXTENDS SOLE PROJECT TO SKATE SHOES

Footwear brand Etnies, which specialises in shoes for skateboarders, turned to tyre manufacturer Michelin in its pursuit of the perfect sole for its new skate shoe.

In 2014, Michelin announced a partnership with Chinese textile manufacturer Jihua to begin developing a range of high-performance soles for the technical footwear market. At the time it said it was targeting a 10% share of this market. It has already created soles for a range of brands, including Under Armour, Salewa and AKU.

It designed a sole specifically for Etnies's Marana OG shoe, an update to one of the brand's most popular designs. Using its Outdoor tyre rubber compound as the starting point, Michelin created a durable, abrasion resistant and slip resistant sole. The companies said it is the start of a long-term partnership to drive innovation in skate shoes.

Michelin said that it "completely reinvented the Marana outsole". The criteria it worked towards were low weight, flexibility, grip and durability.

Rick Marmolijo, Etnies designer, explained that increasing the durability of the rubber traditionally used in skate shoes tends to reduce its flexibility and grip. Michelin created a more durable sole without compromising on the other performance requirements. It is expected to last four times longer than the outsole used in previous Marana models.

PROJECT WANTS TO MAKE RECYCLED POLYESTER FIBRES FROM SHOE WASTE

The European Commission is providing 60% funding for a new project to come out of the footwear industry in La Rioja, Spain's second-most important shoe producing region.

Under a project called Life-Ecotex, the region's footwear research and development institute, CTCR, will lead an initiative to recover polyester from post-consumer-use footwear uppers and turn it into recycled polyester fibres using a chemical process.

CTCR explained on announcing the initiative that the only options available to footwear companies until now were to use a mechanical recycling process that produced only lower-value material or throw the shoes into landfill. Its partners for the project include fibre manufacturer Ekorec.

It will run until 2020 and will have a total budget of more than €1.2 million.

MORE PRODUCTION ON SHOW AT FIMEC 2017

The organisers of the Fimec exhibition in Brazil have announced that they will devote 25% more space at the 2017 event than in previous editions to an idea called the Concept Factory.

At the show, which takes place in Novo Hamburgo, March 14-16, there will be 60 workers operating four footwear production lines in real time, allowing Fimec visitors to watch. The production lines will be for women's and men's leather shoes, with direct injection soling among the technologies on display.

Local footwear brands Usaflex and Pegada will work in partnership with Fimec, producing the women's and men's shoes respectively. Another 60 partner companies are supplying machinery, components and materials (including leather) for the Concept Factory. 🌀



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.

09/02/17

George Cox slams sham Strummer shoe scam

08/02/17

Footwear products among ISPO Award winners

07/02/17

Deckers suffers after drop in Ugg revenue

06/02/17

European Parliament wants to make sport a political priority
Fourth quarter growth boosts Ferragamo

03/02/17

Coach "thrilled" with Stuart Weitzman results

02/02/17

CLE hosts second Designers' Fair in Chennai

30/01/17

Fourth quarter recovery not enough for Tod's

27/01/17

India's top leather-sector exporters named

26/01/17

Major Asian cities are "saturated" with luxury stores

25/01/17

Yue Yuen 2017 revenues flat compared to previous year
Pensole launches 2017 World Sneaker Championship

Assintecal takes a delegation to Colombiatex for the first time

20/01/17

Joint efforts will aid sustainability, Assintecal president says

19/01/17

Nike aims to make marathon history in 2017

16/01/17

Athleisure shoes continue to encourage Stella International

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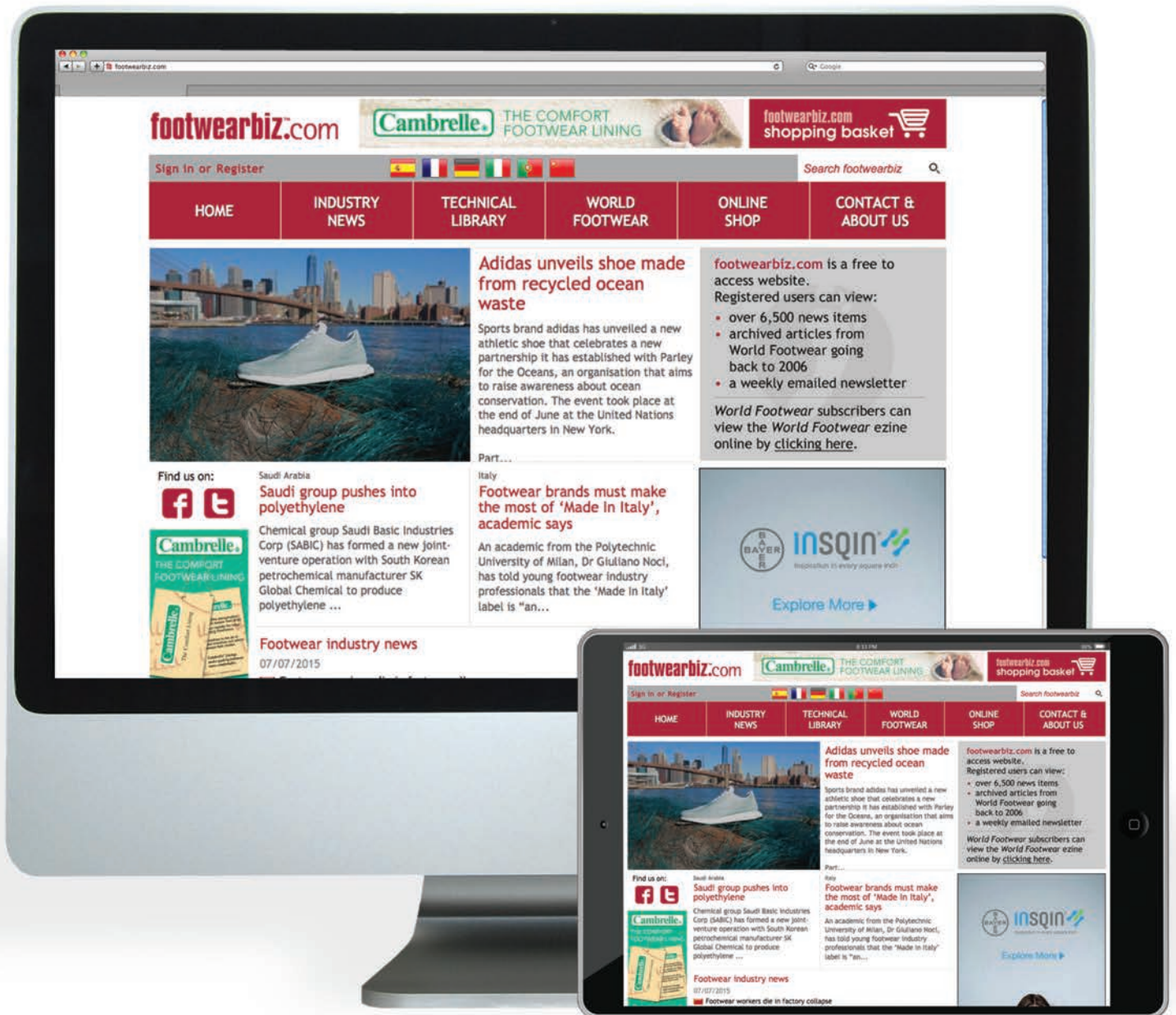
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Automation is such an important part of The Lighthouse set-up—a robot cut the ribbon when the facility opened in mid-2016.

CREDIT: UNDER ARMOUR

To The Lighthouse

Athletic brand Under Armour stands to gain if a much-trumpeted (during the 2016 presidential election campaign) new emphasis on making products in the US comes to pass. The company has said it does intend to increase the volume of product it makes in the US, but only as part of a strategy aimed at producing locally for local consumers in all parts of the world. To make this possible, the Baltimore-based company opened a new fast-prototyping and design centre called The Lighthouse in its home city last June, equipping it with advanced knitting, cutting, sewing, 3D printing and footwear construction technology, collected in an open-plan setting under one roof with lots of natural lighting. Using this facility to test new design ideas and to make and refine product prototypes using advanced manufacturing equipment and processes is allowing the company to save costs, create new products and to shorten the time required to take them from concept to store shelf.

Lighthouse director Adam Bayer says that, typically, it previously took 12 months for the company to bring a product from concept to shelf and that this has now come down to four months (in some very specific cases), with design ideas still going through as many iterations as before. In footwear, the company is using 3D printing technology in the rapid development of midsole prototypes at a fraction of the cost of traditional methods using factory partners. Among

Under Armour opens the doors of its new fast-prototyping and design centre in Baltimore to World Footwear.

the 3D printed materials on show to visitors are athletic shoe soles, with printed treads, all the result of development work that design teams, mostly based at the main Under Armour campus a couple of kilometres away, are constantly carrying out. The benefit, once again, is that these designers now get to see from one day to the next (the printing mostly happens overnight) what their ideas will look like, see how practical they are. Even in the very recent past, Under Armour and everyone else would have waited a long time to have the physical object in their hands. "Everything was an ocean and-a-half away," Adam Bayer says.

Vision for the future

Mr Bayer says Under Armour's vision for the future is to use The Lighthouse, which has pilot lines for footwear and for apparel, to perfect the design, material choices and production flow for new products and then to send detailed information about how each product must be made to outsource manufacturing partners around the world.



Under Armour founder Kevin Plank at the opening of The Lighthouse fast-prototyping and design centre in Baltimore.

CREDIT: UNDER ARMOUR

However, he makes it clear that it wants these manufacturing partners to operate in the various markets where Under Armour sells its clothes and shoes. "We call this approach 'Local for Local,'" he explains. "And it's not just about making product in the US. We want to do that, but we also want to make product in Brazil for Brazil, in Europe for Europe, and so on." There will only be one Lighthouse, but it will light up the path ahead for the whole of Under Armour as well as for its partners.

Roll-call

Without a strong commitment to partnership, the brand may never have got The Lighthouse project off the ground. A total of more than 20 technology providers and other partners have a presence at the facility, which is located in an old bus garage near the Hanover Street Bridge over the Patapsco River in South Baltimore. Among the names on the list are several that are familiar to *World Footwear* readers, including footwear automation provider Desma, material science company Dow and materials provider Huntsman. Adam Bayer describes the technology providers who have a presence there as friends as well as partners. "We wouldn't be able to do what we are doing here without them," Mr Bayer continues. "We expect to benefit our partners by recommending their technology to our contract manufacturers and adding it into the process we've helped create the blueprint for at The Lighthouse." Equipment from less well known technology providers also catches the eye inside the facility; an automated footwear priming and cementing line from Tuscany-based Robot System Automation is a good example.

There has to be a better way

Adam Bayer points to the Robot System machinery and explains it is fulfilling a function that is more typically carried out by teams of people, perhaps 70-strong, in factories in Asia. In well run factories, people wear masks and gloves and use brushes, but they still spend hours upon hours every day applying glue. "One of the benefits The Lighthouse will bring is that the automation we will encourage in our partners' factories will free those people up to carry out better jobs," he explains. "Another is that it will help us eliminate variation." He goes on to say that The Lighthouse had been in the works for at least two years before it opened. "Really, it's the result of our teams visiting the factories that make our products in Asia," he insists, "and seeing people, using toothbrushes to apply primer and cement to shoe uppers and soles. Our senior people said to themselves that there has to be a better way. And there is a better way. This is it."



Desma technology at The Lighthouse. The automated footwear machinery provider believes the use of advanced technology in shoe manufacturing can open doors to new producers, companies that have never made shoes before but are used to running highly automated production set-ups.

CREDIT: DESMA/UNDER ARMOUR

Plug-and-play

Ambitious outsource manufacturing partners who are willing to invest and implement the workflows and production practices Under Armour is developing have an opportunity to grow close to the sports brand and build a rewarding, long-term business partnership. It's hard to imagine anything other than a relatively small group of manufacturers who have the capital to invest in the technology and the knowledge to turn Under Armour's prototypes into for-sale products. The vision may be for it to be 'plug-and-play', but possibly only a few in a privileged position will have what it takes to do the plugging and the playing.

Reversing a move away from technology

The view of one Lighthouse partner, Desma, is that Under Armour may find it easier than rival sports brands to take a different approach to footwear production because it's newer than others to the world of shoes. In fact, Under Armour unveiled its first shoes at the end of 2008, but it's true that this happened more than ten years after the company was founded. Desma's joint managing director Klaus Freese points out that a 'Local for Local' policy is not where the innovation will come in. "If we turn back time by 30 years or so, all the big sports shoe brands had factories, each producing 10,000 pairs per day, in different industrial countries," he says, "including Germany, Japan, the US, France, the UK, Italy, Brazil and so on. 'Local for Local' was very much the case in those days too." But then production moved to low-labour countries that had what Mr Freese refers to as "much simpler technology". This was a move away from technology and automation, partly because it was difficult and expensive to move the existing technology to those new production locations. Even more than before, shoe production became very much cost-driven, he explains, and committing capital to investing in high-end technology was a priority for only a few producers. "Maybe this led to big brands losing a part of their own production competence," Klaus Freese continues, "and some of their know-how." Today, however, he sees things turning back, with major brands expressing the desire to be closer to production again, lot-sizes becoming smaller, the number of design options increasing, time to market becoming shorter and so on. In his opinion, this opens new doors for manufacturing companies as well as for brands.

Footwear's new players

"This is just a personal observation," he emphasises, "but, while existing footwear manufacturers in Europe, for example, may have a welcome opportunity here [as part of the Under Armour plan] to enlarge their businesses (and most of the factories that I know are certainly not 100% occupied at the moment), other companies, companies that are not involved in footwear at the moment, could also become part of the picture." His explanation is that there are manufacturing companies in other sectors that are finding it hard to achieve growth in what have, traditionally, been their core business areas. "The ones I am thinking of, such as Oechsler, which at the moment makes locking systems for cars, medical devices and touch-control systems for refrigerators, already have the capability to run a highly automated production set-up. They are already close to Industry 4.0 and they could jump into the footwear picture.



Automating parts of the shoe production process such as cementing improves the factory environment and reduces labour and cost.

CREDIT: ROBOT SYSTEM AUTOMATION/UNDER ARMOUR



Robot System Automation's automated footwear priming and cementing technology is in place at the facility.

CREDIT: ROBOT SYSTEM AUTOMATION/UNDER ARMOUR

A mix of existing shoe manufacturers with deep knowledge of shoemaking and other companies with knowledge of automated production processes could be the answer."

Those who make the grade could be in a position to set up 'Local for Local' production centres wherever Under Armour needs them. In our rapidly changing world, established footwear firms may not be the only ones applying for the role. New rivals may be attracted by the beam of The Lighthouse. 📡

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Caleres has signalled its intention to grow its presence in the men's footwear market with the acquisition of high-end leather shoemaker Allen Edmonds.

The right fit

“One of the great gems in men's footwear”; that is how Diane Sullivan, CEO and president of US footwear group Caleres, describes men's shoe brand Allen Edmonds. She made the comment after her company, known as Brown Shoe prior to 2015, paid \$255 million to add the brand to its already rich portfolio. It had been in the hands of private equity firm Brentwood Associates since 2013.

“The addition of Allen Edmonds to the Caleres brand portfolio allows us to rapidly increase our exposure in men's footwear,” she says. The company's brand stable is dominated by women's labels, which include Diane von Furstenberg, Via Spiga and Franco Sarto. Its men's offering is headed by George Brown Bilt and Vince. It also operates US discount retail chain Famous Footwear, which it acquired in 1980. Ms Sullivan admits that Caleres hadn't previously viewed men's shoes as an important strategic focus, but in Allen Edmonds it saw an

opportunity to explore a new revenue stream with a “totally different segment of consumers”. She predicts that its size and scale could see it become a “cornerstone” of Caleres.

The shoemaker was founded in 1922 in the town of Belgium, Wisconsin by Elbert W. Allen and Billy Edmonds. Prior to Barack Obama, it was the brand of choice of four consecutive US presidents; Ronald Reagan, George H.W. Bush, Bill Clinton and George W. Bush all wore its shoes at their inauguration. It splits production between the US and Dominican Republic, with the company having long resisted the temptation to manufacture in China for fear of compromising on the quality of its products. It is passionate about safeguarding jobs in the US; although the uppers for many of its shoes are cut and sewn in the Dominican Republic, they are shipped back to the US for assembly, taking advantage of the free-trade agreement in place between the countries. It also uses US-made leather, with US tannery Horween Leather



Allen Edmonds has been making high-end men's shoes for nearly a century.

ALL CREDITS: CALERES

among its suppliers. Its Goodyear welted shoes are handcrafted using a 212-step production process. It also makes belts, leather briefcases and bags, and apparel, which are sold at 70 company-owned stores across the US.

Major player

In 2015, the last period for which full-year results are available, Caleres achieved net sales of \$2.6 billion, a 2% increase on the previous year. This made it the sixth largest non-athletic footwear group by revenue. The subsequent year got off to a less positive start. In the first nine months of 2016, revenue fell 1.5% year-on-year to \$1.9 billion. It attributed this dip in sales to "planned reductions" in its healthy living segment, which includes brands like Dr. Scholl's, Rykå and Naturalizer. Sales from its brand portfolio actually fell 5.2%, with an increase in revenue from Famous Footwear providing some relief. On reporting a slight sales growth in the third quarter, Ms Sullivan said the group's strategy of "diversifying across brands, channels and products" was helping it make progress in the pursuit of "consistent, profitable and sustainable growth".

The purchase of Allen Edmonds, which will allow Caleres to broaden its consumer appeal, is a continuation of this strategy. "We see tremendous opportunity around Allen Edmonds' direct-to-consumer business, which represents 75% of current sales," she says. Its "loyal customer base" was one of its most appealing qualities. She adds that over 70% of its customers have said they would recommend the brand, something which Caleres "thought was unheard of", while the fact that 48% of their retail customers are new to the brand shows that it is continuing to grow.

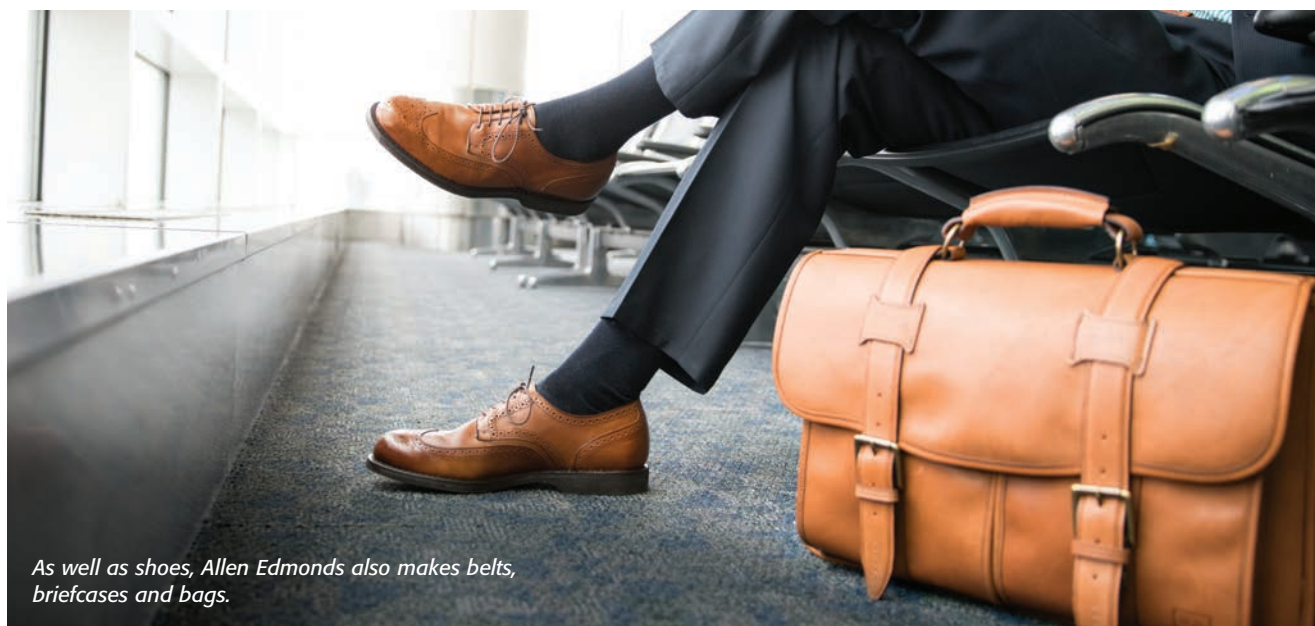
Allen Edmonds also has something to gain from the relationship. "We'll be sharing our men's footwear knowledge and expertise, while simultaneously benefitting from the brand development, materials sourcing, product development and design capabilities inherent in a much larger footwear organisation," explains Paul Grangaard, president and CEO of Allen Edmonds. He sees the brand as an "ideal fit" for Caleres.

"We understand how special the Allen Edmonds brand is to its current consumers, and we plan to take it forward in a careful and disciplined way," Ms Sullivan reveals. There are no



Diane Sullivan, CEO and president of Caleres, says Allen Edmonds is a brand with great potential.

plans to lay off any staff or executives at Allen Edmonds; its 1,050 employees, including 300 in the Dominican Republic, will join the Caleres team. Nor does it intend to relocate any existing manufacturing operations. "Over the next few months we will work together to identify ways to benefit from each other," she says. She believes that Caleres can improve its own speed to market by exploring the "manufacturing resources" of the new acquisition, and is confident that its "extensive knowledge and expertise" will help Caleres establish itself as a major player in men's footwear. 📌



As well as shoes, Allen Edmonds also makes belts, briefcases and bags.

Quality and traceability

PHIL SHAW, SATRA

The General Product Safety Regulations 2005 is a statutory instrument of the UK Parliament that demands that 'No producer shall supply or place a consumer product on the market unless the product is a safe product'. Many other countries have similar legislation requiring the company placing the product on the market to have carried out realistic and effective checks to assure themselves it is safe and fit for purpose. Should any complaint result in legal proceedings and a claim for compensation, these checks will form part of the due diligence defence that will be considered by the courts. To meet these challenges, there are a number of key steps that comprise this approach to due diligence.

When customers consider the purchase of shoes, they will often select products with a specific brand, one they have perhaps purchased before and with which they were satisfied. In their minds, the brand has become a recognised symbol representing quality and, hopefully, value for money. A brand's importance cannot be over-emphasised as it is a key element when shoppers decide on a purchase. Companies consequently spend a considerable portion of their marketing budget developing and maintaining their brand.

Nevertheless, few companies can exercise complete control over every step in a supply chain, stretching from initial conception of the design through to final delivery. Instead, it is more usual for strategic partnerships to be established. Such relationships see manufacturers working with design, material and component suppliers, and also resourcing companies and middlemen. Should a problem with completed products occur, pinpointing the cause and implementing remedial actions can be problematic.

Of the estimated 21.9 billion pairs of shoes made in 2013, possibly up to 2 per cent (around 438 million pairs) did not reach the required standard and were either sold below the required price or



Most countries have legislation requiring a company placing a product on the market to have carried out realistic and effective checks to assure themselves it is safe and fit for purpose. ALL CREDITS: SATRA

did not reach the market at all. If we assume a minimal value of \$10 per pair, this is in excess of \$4.4 billion each year. Aside from the financial implications, there is also the wasted effort and resources, as well as the problem of disposing of substandard products.

There are several critical stages in the development, production and distribution of footwear. If these are carefully and consistently managed, they will reduce—or even eliminate—the occurrences of faulty footwear. These stages are more complex and challenging than they would be if one single company controlled the entire process. Managing the supply chain therefore becomes the responsibility of a number of people who must work together and communicate effectively.

DESIGN & DEVELOPMENT

Many large brands or resourcing companies create new concepts that then undergo significant change and revision as they progress through the product development cycle. This may

occur thousands of miles away and in a very different time zone from the actual place of manufacture. Decisions made at this early stage should therefore ideally be made while taking into account the local conditions, levels of skill and availability of manufacturing equipment that will eventually be needed.

The choice of materials and components should be specified as precisely as possible or, if this cannot be done, then the physical and chemical standards documented. This is a critical step, as ensuring that materials and components are fit for purpose will prevent costly and time consuming mistakes, in addition to replacements later in the supply chain. Some materials, especially leather, may have already undergone significant travel and changes of ownership during their processing. This underlines the important role of laboratory testing and accreditation for this and, indeed, all materials or components entering the supply chain.

The process of compiling the specification for each product will usually take place in stages, using the input of designers, developers and costing personnel. Wherever possible, manufacturing personnel should also be included, as they will have a view on the local availability of materials, the need for any specialised equipment that may be required during manufacturing and the practicality of the intended processes. At this stage, it should be possible to list the operational sequence necessary to manufacture the shoe, identifying not only equipment that would need to be modified or purchased, but also any additional people or new skills that may be needed and which will require a training programme to be designed and implemented ahead of production.

As the information covering the materials, components and operations is compiled, the likely cost of manufacturing the shoe can also be created. However, simply assigning a numerical value to the amount of material or time necessary will not result in a realistic manufacturing cost.

MATERIAL UTILISATION

Materials that are cut into components require a different approach to costing than individual items such as insoles, box toes and buckles, which have a known cost and do not require any additional work before they are used. Any cut component will cause waste when the various sections are interlocked together during the cutting operation. Their shape, the number required and the dimensions of the material to be cut are key factors. In the case of synthetic materials, which are generally cut in multiple layers, there should be fewer issues with quality other than questions regarding surface texture or pattern. However, the temptation to stack a large number of layers to increase efficiency can often result in minor savings in labour at the expense of materials which are often of greater value.

If leather is being cut, there are the additional complications of shape, size, the lines of natural tightness within the leather and the variations of quality and surface appearance across the skin. Ideally, the leather supplier and the manufacturing company should agree clear and measurable standards of



Materials such as leather may undergo significant travel and changes of ownership during their processing.

usability that reflect the customer's requirements before delivery begins. Recent surveys have indicated that the actual amount of leather needed to ensure the correct number and quality of cut components can often be over 50 per cent more than the area of the actual components.

LABOUR EFFICIENCY

Using a computer-based, pre-determined time system, it is possible to calculate precise operation values. As long as the system user can identify a realistic and sustainable working method, together with an achievable sequence for these operations, the actual time necessary to manufacture the shoe can be known at the design and development phase. However, establishing that an operation will take a known time is not the end of the process. The operation time is only valid if that particular operator is fully occupied throughout the working day. Very few operators achieve more than 75 per cent efficiency due to ineffective

planning and line balancing, as well as poor method engineering.

Most shoemaking operations will include an element of non-value added time, such as collecting the work, moving it at the work station, machine adjustments and waiting for the machine cycle. While some of this may be unavoidable, a careful analysis of the proposed operation can identify the potential for method improvement resulting in a lower operation time and, therefore, greater productivity. It is worth pointing out that, generally speaking, an efficient method will also result in less operator fatigue and fewer quality issues.

PROCESS CONTROL

The core of the product information is specifying the appropriate standard of physical and chemical properties needed by each material and component, and also detailing the sequence of necessary operations. Other key aspects which need to be carefully managed are actual conditions during these operations. Factors such as temperature, pressure and time must be continuously monitored and controlled to ensure the operation is performed correctly and the outcome is as intended. Many operations are carried out on equipment which displays these factors and thus can be easily monitored. This equipment should however be periodically checked for accuracy.

If it is not possible to easily see what the conditions are, secondary process monitoring can be employed such as heat sensitive crayons, pressure gauges and timers. It is possible to use simple devices that will warn when the process conditions have moved outside a pre-set range. If the process control conditions are found to be incorrect, it is critical that they are immediately addressed and any footwear already processed is inspected for faults.

PRODUCTION PLANNING

Despite the best efforts of development personnel, the manufacturing costs identified will be based on an assumed level of overall productivity. When the supply chain stretches over a number of suppliers there can be a significant difference in the level of efficiency achieved. Furthermore, each supplier may have

different equipment, skill base and cultural issues, such as payments and incentive systems, levels of supervision and working hours. The overall effect could be to affect the potential productivity that can be achieved.

The ideal situation is for a production line to be dedicated to a single product for an extended period of time comprising days and or even weeks which will allow the personnel to develop a level of expertise and familiarity, and so minimise lost time. It is not always possible to maintain this level of stability and frequent style changes will occur, significantly reducing the productivity that can be achieved.

Production planning personnel should attempt wherever possible to minimise style changes, as well as attempting to balance the line. In any sequence of operations, there will be a bottleneck. This is the operation which takes the longest individual time and often cannot be re-engineered or carried out by additional operators. It thus sets the overall level of productivity for the entire line. Other operations can be analysed to identify those which can be combined or re-engineered to ensure the supply of work to the bottleneck is constant. Any time lost due to delay or breakdowns prior to the bottleneck can never be recovered as, by definition, the bottleneck is already working at 100 per cent efficiency.

OVERALL TIMESCALE

The manufacturing phase of the supply chain is rarely the longest link in the chain. Supplier companies working efficiently can produce footwear in a matter of a few days and, in extreme cases, a few hours. However, unless these finished products are promptly transported to the market, and hopefully sold, much of the effort into raising productivity within the manufacturing plant will have been wasted.

Finished footwear represents a significant level of investment. The further along the supply chain that shoes travel, the more cost they incur. This investment is capital employed which incurs interest charges. Moving finished products as close to the final customer and as quickly as possible should therefore be a primary goal of supply chain management. This applies equally to the launch of a new range or replacement stock for



Supply chain management is the responsibility of a number of people who must work together and communicate effectively.

footwear that is selling well. Efficient manufacturing (often using lean manufacturing principles) can be used to reduce waste within the actual production process, as well as a means of delaying the start of production.

The proven ability to manufacture footwear within a short lead time can allow production planners to schedule the start of manufacture close to the required delivery date, thus reducing the level of capital tied up as work in progress. Some of this capital will be invested in a reliable delivery chain for sufficient levels of raw materials and components, although this will be significantly less than financing finished products.

The actual length of the supply chain will of course vary depending on the type of product, the market and geographical issues. In most cases, though, the time taken to transport finished products from the country of manufacture to the market averages 29 to 35 days. It can take up to three at the port of loading and the same to unload and clear the cargo for onward transportation. When you add the time the products will be stored, the overall supply chain can be as much as eight weeks during which they can experience a wide range of conditions.

TRANSPORTATION ISSUES

Not all footwear is packaged traditionally in tissue paper and a cardboard box. To save cost, lightweight alternatives are used, including polystyrene containers, paper bags or even shipping the shoes in thin plastic to be properly packaged at the final market place. Whatever the method, it should offer protection during transportation and storage. Long periods of exposure to high temperatures and humidity can result in mould or discolouration as well as softening of adhesive bonds leading to sole attachment problems. Using wrapping paper impregnated with a mould inhibitor can help to minimise or eliminate much of this. Prolonged storage can also exacerbate hydrolysis leading to breakdown of both uppers and soles.

If continuous problems are experienced with products that have been damaged in transit or exhibit signs of breakdown at a later stage, it is possible to use miniature data loggers to record temperature and humidity during transportation and storage. Analysis of this can help to identify if, and when, the conditions that could be the cause are occurring. Finished footwear that has been correctly packaged and transported can also be damaged

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during storage at the final destination, either at the wholesalers or within the retail environment. Over 20% of athletic footwear sold in the USA in 2014 was bought online. So, in addition to the storage and shipping that takes place throughout the industry supply chain, these one-in-five pairs of footwear sold online also need to be carefully packaged and transported to the customer's home.

TRACEABILITY

It is important to differentiate between faulty products that can constitute a safety related complaint and products which are considered aesthetically unacceptable by the customer. It is the faulty products which need to be identified and action taken to minimise or eliminate them. In most markets where footwear is sold in quantity, there is legislation to protect the customer from faulty or dangerous products, or those that are unfit for purpose. While such legislation varies between countries, the overall principle is that the company that places the product on the market has the responsibility to meet the standards as directed.

The most effective method is for the product to have traceability throughout its manufacture. All personnel involved at each stage of the supply chain have a responsibility to understand what is required for the product to be correctly made. They must monitor and ensure that this actually occurs, ideally using a carefully managed laboratory-based testing and inspection regime and, most importantly, record any problems.

Should a fault occur, either in the manufacturing process or when inspecting and testing materials and components, not only is it important to correct it, but also to be able to identify all of the footwear affected. Of course, incorrect or faulty products may not be identified until later in the supply chain or even during wear when the customer complains and returns the shoes to the retailer, and so the need to trace any other affected shoes is paramount.

DUE DILIGENCE

A serious issue with quality or fitness for purpose could result in a claim from the customer. Apart from the financial implications (compensation, damages and loss of sales), there is also the effect on goodwill, customer confidence and



Required standards should ideally be fully monitored using a laboratory-based testing regime and all problems recorded.

future sales. In extreme cases, where the complaint results in legal action, the ability to demonstrate that realistic and sustainable quality assurance was exercised throughout the supply chain (due diligence) can be critical.

Companies may increasingly be required to show that their supply chain maintained an acceptable standard of human rights, health and safety and environmental care. While these issues do not impact specifically on the quality of the individual shoes produced, companies which can show that they care about these situations generally experience a higher level of overall satisfaction. Personnel who feel safe and appreciated will generally perform to a higher standard and, by implication, produce consistently good work.

TRAINING

As well as the systems and documentation used throughout the supply chain, achieving consistent and acceptable levels of quality, delivery and effectiveness will depend on the people involved. Providing the necessary level of training is not only essential, it is also important to ensure this training is constantly reviewed and updated to reflect changes in materials,

manufacturing methods and equipment. The footwear sector often experiences a high level of labour turnover. This not only puts pressure on the training and retraining necessary, but also requires management throughout the supply chain to be aware of potential problems due to inexperience and unfamiliarity as operatives learn new skills.

Similarly, the introduction of new styles can highlight the need for increased awareness as production personnel become familiar with the changes. An additional issue can arise when the manufacturing company produces footwear for a number of different customers or resourcing companies which, by implication, can mean different quality standards.

The footwear supply chain continues to grow and change, presenting new challenges as innovative styling and materials are introduced. The final customer has come to expect ever-higher standards of consistent quality as achieved by electronic and IT products and footwear must strive to emulate this. A combination of realistic management processes, information and quality control and, most important of all, people skills, can help achieve it. 

CREDIT: MESSE DÜSSELDORF, CONSTANZE TILLMANN



Stronger insoles for high heels

BJÖRN SCHULZ, FILK, GERMANY

There are various concepts of fashionable designs for high-heeled shoes which, as yet, cannot be realised. It is also not fully known how suitable materials could be engineered as regards the economic and technical demands these shoes would impose. Tests to characterise the static and dynamic forces occurring when walking in high-heeled shoes are not always sufficient a basis for R&D into innovative new design concepts.

The key to economic success for manufacturers and distributors of high-heeled shoes is to broaden their current spectrum of inventive designs so as to strengthen the 'WOW' effect for their

customers. The application of new material and construction principles must therefore also be included in any R&D programme. Input from researchers, engineers, manufacturers and marketers has all to be considered in order to gain new concepts for shoe designs that will be successful.

The Pruef- und Forschungsinstitut Pirmasens (PFI) and the Forschungsinstitut für Leder und Kunststoffbahnen (FILK), combined their expertise in shoe and material know-how to initiate a research project under IGF/AiF-grant no. 17868 N mainly aimed at small- and medium-sized enterprises (SMEs) which included the following research projects, the sub-

steps and current results of which are given in *Figure 1*.

1. Engineer new insole materials using an iterative prototyping development approach.
2. Test the improved materials and determine gait-physical characteristics of the insoles.
3. Prepare insole samples using standard shoe-technology within SME environments.
4. Incorporate the improved insoles in actual high-heel shoes.
5. Analyse the improvements using test participants in gait and shoe pressure tests.

TEST PROCEDURES

The connection of the pin used to secure the heel to the insole is inefficient due to inadequate strength in the construction of the insole itself. Any potential improvement in the holding strength of the insole would help make it possible to realise more advanced structures for high-heel designs. Standard cellulose board insole materials were combined with various others to produce trial laminates. These were then compressed and cut out in order to produce insoles for use in prototype shoes.

The approach taken was to use different textile reinforcement elements for improving the mechanical strength of the insole while, at the same time, maintaining the material flexibility properties needed for comfortable gait; for example, narrow-woven fabrics made using mono- and multi-filament glass, and polyester yarns. We compared the impact for improving the mechanical strength as well as the bending properties which are essential for walking comfort.

Due to the 4th paradox of composite materials (so-called Slayter-paradox) that dictates how adding extra fibres can add strength to a laminate, insoles produced as textile reinforced laminated composites do indeed improve the pin-holding strength. Materials and fabrics which are readily available such as acrylic, polyolefin, glass or polyester fibres have been used for these investigations. Aramid or carbon-fibre based solutions would not be a reliable choice for a consumer goods market. A typical insole



Figure 1 – Steps and results for engineering insoles for high-heeled shoes.

CREDIT: PFI

sandwich-type composite is shown in *Figure 2*. Cellulose insole board was used for the basic insole on to which various textile reinforcement fabrics were applied using an industrial adhesive. Finally a cellulose-based board was used for the top side of the insole in the waist and heel area.

Due to the fact that the cellulose-based materials used show anisotropy (different properties in different directions) in their mechanical behaviour, we oriented the warp direction of the textile fabric parallel and perpendicular towards the fibre orientation in the cellulose-based layers. The bending modules of our developed insole laminates have been determined to be in the range from 290 MPa (megapascals) to 500 MPa (according to DIN EN ISO 178), which can be compared to commercial

materials for insoles, where it is normally in a range between 300 MPa and 800 MPa.

TEST RESULTS

Three types of woven fabrics and laid webs for reinforcing laminate structures were tried.

1. Narrow-woven polyester and glass mono- and multi-filaments and yarn.
2. A laid web of polyester filaments on a glass fibre non-woven underlay.
3. Reinforcement woven fabrics made of rubberised clinched glass fibre filaments.

The heel-pin holding strength of commercial insoles provided by SMEs and our developed laminate samples was analysed according to DIN EN 12745 and ISO 20867. Results are given in *Figure 3*. Values for various industrial reference materials normally fall within a range of 285 N up to 385 N. In comparison, our test results showed that by using different textile reinforcements, we were able to increase the heel-pin holding strength up to a range of 530 N to 875 N. The best results were obtained using narrow band woven fabrics made of polyester fibres and were up to 2.5 times higher than with standard material combinations.

The orientation of the woven insert in the insole laminate certainly influences the holding strength, whereas the warp or weft weave direction makes only a small contribution. In our samples, where the orientation of the woven

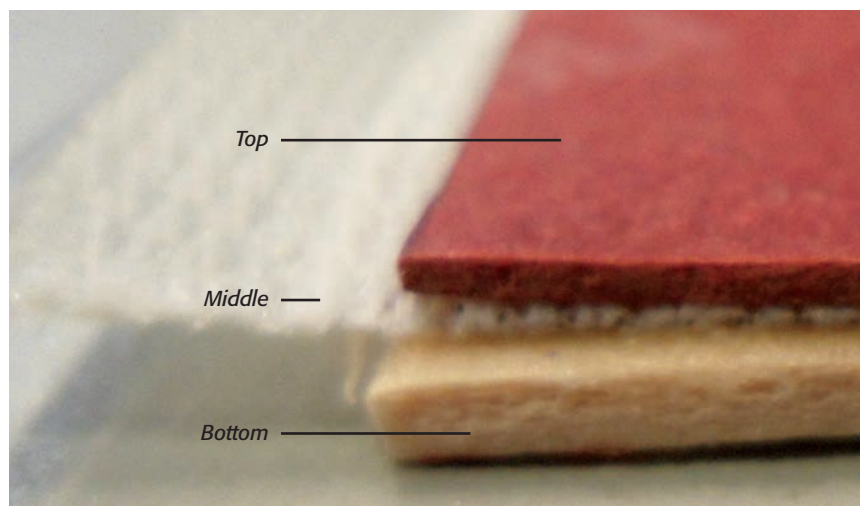


Figure 2 – Structure of the laminated insole. Top: cellulose-based top layer. Middle: textile reinforcement. Bottom: cellulose board basic insole. CREDIT: PFI

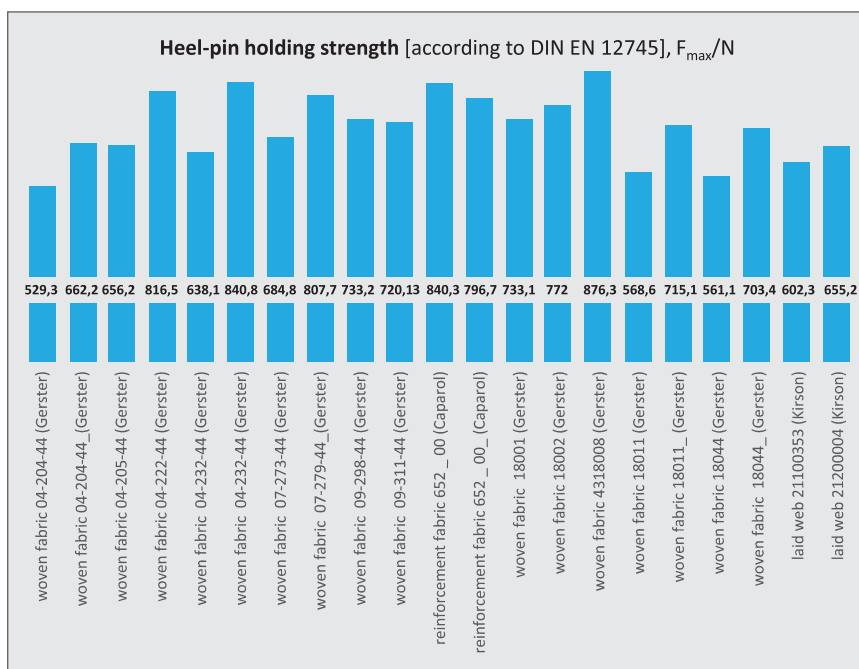


Figure 3 – Heel-pin holding strength is up to 2.5 times higher than on current commercially available insoles. CREDIT: PFI

HIGH HEELS - ALWAYS A PROBLEM

Throughout history, most women have always liked high heels. This has partly been due to the fact that they made the wearer appear taller and, when skirt lengths became shorter, to flatter their legs by tightening the calf muscles and making them look slimmer and more elegant. Needless to say, there have also been women who were prepared to take fashion to the extreme as witnessed by this example from the end of the 19th century which at 17cm must have created quite a problem for walking.

It would also have created problems for the shoemaker except for two things. The first is that the shoes would probably have only been worn briefly on special occasions. The second is that the actual area of attachment is large which allowed the stress loads to be spread over a wider area and a large number of attaching pins.

Modern extreme heels such as those shown in the title image for this article are small in area and so rely on a single large serrated central nail. The heels will be made from ABS which is extremely strong and with exceptionally good nail holding properties. This means that all the stress is concentrated on the small area of the insole directly around this central nail.

Clearly, the larger the head on the nail, the less the strain on the insole material. However, there are limits on the size of head that heel nailing machines are able to accommodate unless made specially for this application which would not be economically viable. The problem therefore can only be resolved by increasing the insole's capacity to absorb these extreme stresses without breaking or tearing.



reinforcement element is in a cross direction to the insole material, the heel-pin holding strength has proved higher in comparison to a lengthwise one. Nevertheless, they all show a higher heel-pin holding strength in the range of 18–26% regardless of the actual orientation of the woven insert in the laminate structure.

The excellent static and dynamic mechanical properties of fibre reinforced insole laminates definitely increase the stability of high-heeled shoes. We fully expect to be able to fulfil the demands of the shoe industry in respect of substituting current insole materials by textile reinforced insole laminates on the one hand and achieving flexibility and wear comfort for customers on the other. In the next stage of our insole R&D programme, we will use our promising improved sample insoles to produce prototype shoes. Where standard material-locking joints such as lockbolt systems are used, we will engineer a suitable sleeve to connect the high-heel pin with the insole laminate.

Finally these systems will be used for gait analyses and pressure testing during walking. Unfortunately, the fitting of the lockbolt to the insole may lead to undesirable delamination and fibre disruption because the insertion of a steel sleeve leads to a critical radial shear stress expansion. In any case, the increased complexity of the whole screwed and riveted joint structure calls for additional testing in order to design perfect material combinations to improve joint strength. Results of these further investigations will be described in the second part of this article. 🔗

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General view of pre-stitching and stitching lines managed by SmartSL. ALL CREDITS: CTCP

Another step forward

MARIA JOSÉ FERREIRA, VERA PINTO, CTCP

Today we are faced with motivating challenges as footwear manufacture continues to evolve into a knowledge-based industry by the development of new paradigms such as 'digital production'. This includes automatic cutting and production systems, robotics and advanced logistic solutions, all of which are now being applied by leading Portuguese companies. This ecosystem now also embraces new technological, manufacturing, management and marketing possibilities enabled by cyber-physical systems (CPSs), sensors, internet of things (IoT) or hybrid clouds. As these become increasingly integrated, so we move ever further towards the 4.0 goal for the footwear industry.

The Portuguese Footwear and Allied Trade Fashion and R&D Cluster bringing together mechanical, software, automation, robotics, physics, materials and footwear companies and institutes, and engineers and experts, has been working on specific systems, interfaces and standard formats development and application. Data coming from several of the component areas involved is already interfacing well, particularly in the form of cloud services designed to increase efficiency and to drive automation.

BEinCPPS PROGRAMME

There are however, many potential areas of intervention and a number of variables still remaining and so there is significant research and innovation

work yet to be done. One further step in the programme is being accomplished within the European Innovation Action BEinCPPS. This aims to investigate and integrate a CPS-oriented future internet-based machine-factory-cloud service platform at selected Smart Specialisation Vanguard regions within Europe and to then gradually extend the service to cover additional European regions in the future.

The Norte do Portugal (Northern Region of Portugal) is one of the five selected regions and footwear manufacturing the focus of BEinCPPS's first integrations and experiments. In this framework, the Portuguese footwear technical and innovation centre CTCP, the footwear manufacturer KYAIA and the InescTec development

institute—all located in the Norte region—are working with an extensive team of technology developers and providers, and research and innovation centres. Overall coordination of the project is being undertaken by the Politecnico di Milano, with the intention of driving the previously developed High Speed Shoe Factory (HSSF) forward to a 'smarter' level.

The HSSF implemented an agile, flexible and quick response production system that promptly responds to market demands by integrating an advanced cutting system plus internal logistic and management tools to ensure the automatic transportation of materials, components and final product along the whole process chain. This solution eliminates a relevant level of stock of intermediate work-in-progress and dramatically reduces product lead time from three or four weeks to one or two days. At the same time, it allows the production of several shoe models of different constructions and, by this means, the effective production of small batches of different styles.

CPPS APPROACHES TO PRODUCTION

Within BEinCPPS, one of the HSSF results was selected to introduce CPPS approaches within production and maintenance processes. The system is composed of three connected production lines with a manipulator robot in each one and multiple working posts. The HSSF information and communications technology (ICT) architecture contains several programmable logic controllers (PLCs) connected to production line sensors which can be configured by using the proprietary SmartSL program. All the automation software connects to sensors and actuators by a commercial component. At present, the working posts and the manipulators are the component parts producing signals that can be used for analysis. The addition of new sensors (vibration, temperature, etc.) is expected to assist further in achieving the project's objectives.

Using BEinCPPS partners' cyber-physical systems such as sensors, communication tools, software components and new solutions developed in complementary projects launched by BEinCPPS, these signals



Assembly production line.

are read and then sent for storage in a database. All this data can then be mathematically, statistically and technically analysed, treated and then resent via the Internet, Cloud, Big Data or IoT in order to provide alerts and information about delays, deficient planning, impending failures and causes of failures among other things.

ANTICIPATING SYSTEM FAILURES

The project aims to use these results to feed relevant production key performance indicators (KPI) and train a machine learning model capable of recognising and sending an alarm when component degradation is likely to occur, prior to the actual failure occurring. Appellative, interactive and

easy-to-use interfaces are also expected, allowing Kyaia personnel to readily use the information deployed and perform their tasks supported by knowledge enabled by CPPS, IoT and Cloud based solutions and services. The BEinCPPS applications should reduce non-operational time of each production line and system, increase efficiency of the work posts and generally reduce maintenance costs. It is estimated that the successful implementation of the project will contribute to significantly increased work post activity time and reduce operator downtime by around 40%.

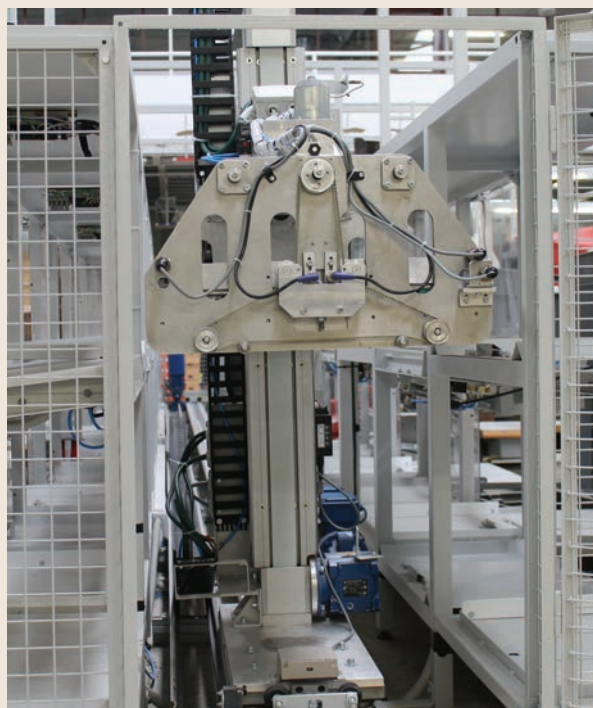
The final aim of BEinCPPS is to improve the adoption of cyber-physical production systems (CPPSs) in Europe by means of the creation and nurturing



The new logic system structure and manipulator.



The robotic manipulator in action at a work post.



of CPS-driven regional innovation ecosystems, made up of competence centres, manufacturing enterprises and information technologies (IT) SMEs. In this framework and under the I4MS European Initiative, the Norte region is also launching a digital innovation HUB located at CTCP the Competence Centre for the footwear and allied trade sectors. At the same time, CTCP is making every effort to identify the training challenges and needs posed by this '4th industrial revolution' at different levels, from formal education at

technical, high school and universities levels on to professional training courses specifically directed to engage the actual work force, thus contributing in a smooth evolution towards adopting this new manufacturing paradigm. 🔄

BEinCPPS will run until 31/10/2018 when a further article will give final details and conclusions regarding the Norte Footwear experiment and complementary initiatives.



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Wetblue hides—how many will be processed for use in footwear? CREDIT: WTP

Leather's mixed fortunes

Not long ago, few would have argued that anything other than leather was the best material for shoe uppers. That notion is now being increasingly challenged on technical, cost and environmental grounds, and footwear's share of global leather production has declined from around 65% in 2009 to nearer 55% today. Is this a temporary blip or are we witnessing a real shift in the relationship between the footwear industry and its traditional source of raw material?

Tanners have long assumed that shoe manufacturers would always need leather. It stood to reason that as people always needed shoes they would be made from leather. It therefore also stood to reason that there would always be willing buyers for their finished product. The relationship has of late begun to appear more fragile and, to a great extent, this is a result of this self same assumption.

High prices pushed some buyers away from leather in the period between 2009 and 2014 when the cost of hides reached record levels. Seasoned observers said the natural conflict along the value chain that links hide traders, tanners and footwear manufacturers has always gone in cycles, so if the price went up, it would eventually come down. On this occasion, however, by the time it did, a number of things had occurred that made it not just possible but even desirable for many footwear brands to resist a return to leather.

TIMES CHANGE

As raw material prices steadily rose to reach a peak of over \$110 per hide in 2014, many brands began to question whether they could any longer afford to use leather in their products. As a result, it is now no longer an essential component of the shoes that many of them sell. Other factors were also

moving in their favour. Several developments in alternative materials, including new woven and knitted textiles and water borne polyurethane coatings, came on to the footwear market at more or less the same time, and low oil prices have kept them cheap. While these materials may lack the durability of leather, products that need replacing after a few months represent good news for fashion-focused brands for whom the most important factor is continual quarterly financial growth.

All of this coincided with the rise of 'athleisure', a fashion trend where much of the clothing and footwear people wear to work out in the gym has become increasingly acceptable in almost every facet of everyday life. Morgan Stanley predicts that, by 2020, it will represent \$83 billion in sales, stealing market share from non-athletic apparel. According to research, innovation and advisory firm Stylus, athleisure is on course to become



Many brands have cashed in on the profitable athleisure trend and may be in no hurry to return to using leather.

CREDIT: MESSE DÜSSELDORF, CONSTANCE TILLMANN



High leather boots may be coming back, but for every woman wearing them there will be 10,000 people buying shoes with synthetic uppers.

CREDIT: MESSE DÜSSELDORF, CONSTANCE TILLMANN

one of the fastest growing global apparel product categories in the second half of this decade. An article in *Forbes* claims sneakers are also expanding into the luxury market, accounting for 25% of new arrivals in 2015, compared with 15% the year before. Athleisure footwear is also easier to make using synthetics.

The drift away from natural leather to alternative footwear materials is further explained by reviewing the financial performance of some of the big shoe brands. However, we need to separate them into two distinct market segments as they show a stark contrast in product offering and customer base. For example, the group including Nike, adidas (with Reebok), Skechers and Puma, all showed double-digit growth last year while Deckers, Wolverine, Rocky and Caleres reported decreased sales and VF Corporation (Timberland's parent) recorded a modest 1% gain.

So what caused this move away from leather? Quite simply, necessity. Cost effectiveness, supply chain management, ease of procurement and product usage all became reasons for not using leather compared to lower oil prices, abundant supply and increased

cutting efficiency when using synthetics. Not only were these practical considerations favouring a move away from leather, from a financial point of view they were even greater. The use of leather impacted the margin traditionally expected; with synthetics profitability increased.

NATURAL APPEAL

Another factor to consider is that human beings change and adapt, sometimes slowly, sometimes rapidly depending on external influences. For instance, it can be said that it is in our nature to connect to animal skins and that the correct material to wear on our feet is leather. The modern digital world has turned many previous attitudes on their heads and leather to a certain extent is one of them. As has been remarked previously in *World Footwear*, many younger people have lost any sensory connection with leather through shopping online and relying on the images sellers upload to form an impression of a product. Leather thus loses its natural tactile advantage when choosing footwear; now it is a case of 'if the image looks good, hit the enter key'.

A colleague from our sister publication *World Leather* attending the All China Leather Exhibition in Shanghai last September noted that, as he travelled into the city each morning, only some 5% to 10% of commuters were wearing shoes with a leather upper. He also heard that high leather boots are about to become fashionable again. However, someone else pointed out that for every woman wearing a pair of these boots there will be 10,000 people wearing synthetic shoes. Even in the USA and Western Europe, one need only walk down the street to see the huge numbers of sports/athleisure shoes being worn and that the majority have synthetic uppers.

STAR-STRUCK

Jon Hopper, VF Corporation Asia's director of leather since June 2015 and a long term holder of senior positions in the leather and footwear industry, feels we are indeed seeing a fundamental change. He thinks that footwear reflects society and that as society becomes increasingly more relaxed about dress, manners, the way we act and so forth, it is inevitable for

this to be reflected in footwear styles. The growth of sports-inspired shoes being worn and admired in non sports environments is merely a reflection of these more general changes.

"There's something else about the marketing of sports inspired footwear. If you look back 20 or 30 years we had sports stars, but sports stars now are celebrities in ways they have never been before." Many fans want to wear similar-looking shoes (usually with synthetic uppers) to those of their heroes and the impact of this on the wider footwear market is impossible to ignore. "It's not necessarily reversible either and I don't see us going back to a world in which most people in major economies wore shoes with leather uppers most days and sports shoes were for taking part in sports."

TECHNICAL CHALLENGE

Apart from the margins, there are other potential advantages for footwear manufacturers in shifting from leather to synthetics. Indeed, in some sectors, this is already well established. For instance, PUCFs (PU coated fabrics and non-wovens) have been extensively used for many years in the production of mass market ladies fashion shoes. They have proved perfectly adequate in what is inevitably a fast changing market where comfort and longevity are secondary to the right look at the right price. Microfibres have also performed well in sports shoes where their lightweight, flexibility and good foot comfort properties have made them in many instances superior to leather.

There are also new and more efficient manufacturing techniques such as developments in no-sew and in knitted constructions that are not possible to replicate with leather. Then there are the completely moulded types of shoe exemplified by Crocs which, whilst lacking any pretensions to style, are both practical and comfortable. The more recent Desma Quadwrap system takes advantage of the durability of polyurethane to produce a shoe which, while not exactly a fashion statement, is nevertheless quite practical for everyday wear. For those with a highly technical bent, the concept will be particularly attractive because it is so high-tech.

Another plus with all these synthetic options is that they lend themselves to automation and, with technology such

as Fly-knit or Quadwrap, shoes can be produced cheaply and with minimal labour. As a direct consequence of the greatly reduced manufacturing costs involved, they can be produced closer to market and even within a market itself. The big thing with all shoes made using synthetics, however, is that good looking products can be made more cheaply than with leather and sold at higher margins.

And yet, there are brands that are staying with leather in spite of all the complexities inherent in the leather supply chain, companies that continue to believe that using leather to make their shoes is part of their DNA. Jon Hopper says it is all about back-story and heritage, things that resonate with the consumer. For certain brands, leather is part of what resonates and they would be risking their brand equity if they changed from a shoe made from leather to one made from synthetics. The risk in the long term would outweigh any financial gain they could make in the short term by switching. The risk for sports footwear brands would however be lower as the public expects them to be at the forefront of developing and trying out new materials and constructions.

NICHE PRODUCT

Specialist leather chemicals manufacturer TFL has announced that it intends to expand its business into 'related industries'. It specifically said that leather and synthetic alternatives will need to co-exist in the future and hinted that providing solutions to help manufacturers of those alternative materials will be part of its expansion plan. It is hard to see how such a move can assist tanners of shoe leather. On the other hand, it could provide valuable input for manufacturers of synthetic upper materials and help them to produce evermore 'leathery' looking products. Dr Jürgen Christner, head of research at TFL, says that, in actual fact, he can see it working both ways.

For example, synthetics producers are already major users of polymers and he can envisage polymer developments that could be of use in leather production too. "Leather and the synthetic material that imitates it are both flexible substrates. Of course leather has a future, but its future is to be a niche product. We have population growth and there are simply not enough hides in the world to satisfy the needs of all the people in



Synthetics can have useful advantages. The leather adidas F-181a of 1958 weighed 352 gms; the new adizero 99g uses a polyester mesh and weighs just 99gms.

CREDIT: ADIDAS

the world, so we need synthetics too. There are market segments that leather cannot address, those at the cheap end of the market and fast fashion, when you throw away the product after one season. It's too much effort to make leather for that; it would be a sin to throw away leather in that way."

But there is also a market segment that will continue to want the uniqueness, the durability and the longevity of leather. Jürgen Christner insists, just so long as the leather is produced in an ecologically sensitive way. "Synthetics cannot compete with this type of leather." As for leather produced in a less responsible way, he says its days are numbered. Not next year or even the year after perhaps, but he predicts tanning at this lower end of the environmental responsibility scale will not just decrease, but cease all together. The argument based on environmental responsibility could of course apply equally to the producers of synthetics.

Fashion is famously fickle and shoes with leather uppers may become overwhelmingly popular again in the seasons ahead. As always, however, price will be a determining factor and a consensus is building which, like Dr Christner, says that making leather as cheaply as possible, sometimes regardless of people's wellbeing or the environment at large, looks to have an uncertain future. This is the part of the leather industry that is struggling to compete with synthetic alternatives, which are even cheaper and probably always will be.

If cheap leather may not have a future at all, we can rest assured that high-quality, high-value leather footwear does. An ever growing global population and a continuing rise in living standards will make it so. At the lower end of the market leather may no longer feature in all the shoes footwear manufacturers produce and synthetics in whatever form will become the accepted norm. Indeed, in a world where free trade is becoming increasingly unpopular in many countries, on-shoring of footwear manufacture will be made far easier by the use of synthetics. Having said all this, there will still be enough people who want leather shoes and are willing to pay the price. 🍷



Desma's WrapNX developed from Quadwrap, is a good looking sports shoe made entirely of PU on one machine with minimal labour content.

CREDIT: DESMA

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Kiruna boots are part of the new Vaude winter footwear series, with TerraCare leather from Heinen and thermal PrimaLoft linings.

CREDIT: VAUDE

Shoes at ISPO 2017

By Penny Leese

ISPO is still a major destination for sports retailers of all sizes from all the German speaking countries and further afield. While ISPO used to concentrate on snow sports like skiing and snowboarding, the scope has recently gone broader; this year there were even yoga displays on paddle surf boards, and self-rolling yoga mats from the US. There were also many more urban products. It's said that the polluted inner city can be harder on equipment than clean powder snow.

Outdoor sports

Outdoor sports is clearly the biggest category at ISPO, filling most halls. Outdoor sports shoes cover everything from trail-running to hiking. The technical versions are usually high-tech and in brightly coloured combinations. Although not so much is said about barefoot technology any more, the soles tend to be slim and low line, but do include cushioning. Of course, the Vibram Five Fingers is now a classic, iconic product. Similar ideas, with fewer separate toes, were shown by Body Glove, the water sports brand. At the same time, classic and retro boots are gaining ground, in black and brown leather for example, from iconic heritage companies such as Meindl, HanWag and Dolomite. There are specialist ski and mountaineering boots, as well as approach footwear too.

Anti-slip on ice

For winter footwear, non-slip on ice, especially for runners, has been an increasing requirement. Vibram has been very active in promoting its outsole technology on wet ice; for winter 2016-17 the company launched it with a limited number of partners, such as Merrell. Now the non-slip technology is available widely for winter 2017-18, and blocks of melting ice on several booths at the fair meant that buyers could test the product, one foot in a Vibram-soled shoe, one foot in the user's regular footwear, so that they could really feel the difference.

Salming Trail5 won the gold outdoor award for its colourful outdoor shoes on Vibram's MegaGrip soles. Vibram MegaGrip is a sticky and very long wearing compound that provides excellent grip on wet, muddy, slippery surfaces as well as dry

The once-a-year ISPO winter sports fair was buzzing, as usual. Penny Leese reports from Munich.

rocky surfaces. The Salming Trail5 is for extremely technical trail-running. It is a lightweight trail shoe made for any kind of weather conditions and any kind of surface: wet, dry, slippery, soft, muddy or rocky. The design incorporates proprietary running support system and cushioning properties. The wrap-around design consists of an exoskeleton, a gusset tongue design and a three-layer upper sandwich construction that is sealed off with a protective thin net mesh.

There are other ways of avoiding slipping on wet ice. TrekSta from Korea has steel studs that can be extended out of the sole with the turn of a wheel (a wheel similar to the Boa Technology wheel that the brand is renowned for). Another turn of the wheel at the heel and the spikes are retracted back into the sole.

David Ekelund, CEO of IceBug, who have been making BugGrip running shoes and boots for ice with retractable spikes for several years, has now issued a challenge to other brands claiming to provide the best anti-slip technology for ice. He feels that the IceBug technology is tried and tested for over 15 years and is the best on the market for function. His opinion is that a highly promoted wet ice sole technology that doesn't really deliver safety and confidence will keep runners and walkers indoors. IceBug had expanded its technology with the BugWeb last season, a soft rubber web with spikes that fits with the pattern of the sole, but can be removable.

For the new season, the company has collaborated with Michelin tyres from France with extra sticky rubber soling, based on winter tyre technology from Michelin. Additionally the soles are non-marking so can be worn outdoors and indoors.

IceBug isn't the only company to collaborate with Michelin: there have been a number of varied partners, from HanWag on hiking shoes to ski boots by Nordica. Nordica has taken technology from Michelin Latitude X-Ice North car winter tyres



Salming Trail5 - winner of the gold outdoor award.

CREDIT: SALMING SPORTS AB



Arc'teryx Procline ski boot is the only hybrid ski boot of its kind, combining features of a climbing boot with those of a lightweight ski mountaineering boot.

CREDIT: ARC'TERYX

and used it on Gripwalk soles on its Striderider ski boots. The interlocking design increases adherence, the chamfers reduce structural wear and the deep grooves evacuate water. The high edges promote better adherence, too, while the multi-faceted lugs help with braking.

Ski and mountaineers

ISPO is still the destination to see ski boot trends. Arc'teryx is always at the forefront with technically innovative designs for clothing and footwear. Its Procline ski boot combines alpinism with alpine climbing boots. Normally in winter a skier will have to use a mountaineering boot for approach and have the ski boots in a backpack. The company has innovatively combined the two technologies to make a single boot. The outsole bottom on the ski boot is the same as the mountain climbing boot. There is rubber toe protection, unusual on a ski boot. All the sides of the boot are totally clean so as not to get snagged on rocks or obstructions. Even the vamp adjustment clip with its tightening cable is going "the wrong way" so it only covers the instep and won't get snagged. The boot can be adjusted for climbing on skis with a non-slip skin attached to the skis, where there is a profile that means the skier can only go forward and not slip backwards. The bindings on these boots are classic touring bindings, called tech bindings. That means that the skier is not attached to the skis at the heel, or can adjust the heel binding for support on a steep slope. The cuff is split in half at the back so that there can be sideways movement, unusual in a rigid ski boot. There is 12% medial movement and 26% lateral movement. Forwards and backwards the boots can tilt about 70 degrees, this means that the user has the same sort of movement as in a hiking boot. Once the climber has got to the top, and wants to ski down, the boot can be converted from

alpinist to ski touring in a few seconds in a simple movement with two buckle straps and a power strap. In addition to not having to carry an extra pair of boots in the backpack, this boot only weighs 1.2 kilos, a considerable weight saving.

Skate and Street

The skate and street area at ISPO was much smaller than before - and this makes sense as this category has got so much stronger in the city; and large successful street and skateboarding fairs SEEK and Bright were held in Berlin a couple of weeks previously. At ISPO you can see snowboarding boots, bindings and also some street art. But nowhere near as much street wear as a few years ago.

Apps

Today there are apps for everything, even to find your way round the ISPO fair. The company IOFIT won an award for hardware and devices. This is a smart golf shoe with sensors in the soles to track and analyse all movement and technique. This information can be downloaded and analysed later.

Natural materials

Each year at ISPO fair, more companies appear to be embracing the environment, from using natural materials to more environmentally conscious sourcing and so on. HanWag's double-welt stitched hiking boots in natural leather can be sent back to the factory for resoling at any time.

Birkenstock, famed for its cork footbed natureform sandals launched a whole new line at ISPO, with a locker-room inspiration. The company has taken its classic footbed construction on natureform lasts, and recreated a high-level retro inspired leather sneaker collection, mostly in black and white full grain leather. The entire backdrop was a retro gym from about 50 years ago, with leather horses and bucks, with metal lockers in the locker rooms. These high-level sneaker-inspired shoes may not see so many actual locker-room interiors, but they are good all-year-round wear.

There has been a revival in interest in natural materials for winter – as can be seen by the Scandinavian knitting firms with merino wool soft shells, and layering garments. Dachstein's boots in natural wool felt, especially in classic grey, combined with leather in traditional welted style boots, look both retro and fresh at the same time. Wool felt is not just natural, it is cozy too and appears on all types of footwear from winter boots to home slippers. New from Austrian wool slipper maker Giesswein were pure wool joggers, with soft unstructured uppers – even the eyelets are embroidered rather than being metal inserts. These clean simple jogger-inspired shoes come on a simple moulded EVA sole, a little Nike Free-inspired – clean, classic and neutral, and available in lots of colours in natural dyed wool.

BERG Outdoor won a gold award for footwear lifestyle. Made in Portugal with a mix of wool felt and real Portuguese cork textile, the simple style on a sneaker sole mixes environmental demands with the right trends. The sneaker is recyclable, as well as being warm and water-resistant.

Vaude's Kiruna boots are made of insulating felt materials, premium TerraCare leather from tanners Heinen and thermal PrimaLoft linings. They come in versions for men, women and kids. Terracare leather is tanned in Germany in accordance with the highest environmental standards. The integrated felt made

with recycled materials insulates in icy temperatures. The integrated Ceplex Green membrane keeps feet dry and ensures good breathability. An EVA midsole adds cushioning. Inside shoe comfort is very important, so the Ortholite soles are removable and are made of recycled polyester and 25% bio-based castor oil (Eco Plush PU foam).

Comfort in footwear is increasingly important, as one can see from the increased use of memory foam insoles and the enormous success of Skechers in this field.

Personalisation and individuality are lifestyle trends. At ISPO personalised insoles for all sports are available, from foot scanning, gait and pressure analysis, to heated and moulded inserts. Many of these are services that can be offered to retailers. Currex offers a two-minute analysis from the user walking back and forth along a short carpet; the sensor in the middle checks each foot individually as well as finding out weight, pressure and so on. It makes a coloured scan showing how much each pressure area of the foot is in contact with the ground—flat arches, for example, can be clearly seen.

Kavat from Sweden is not considered a sporty brand but has done very well. The company was founded over 100 years ago as a children's brand and is now the official after-ski boot supplier for several Scandinavian athletic teams competing internationally. The company's proud aim is to reduce the ecological footprint to make sustainable shoes, using the EU EcoLabel. All the adult shoes and boots are resolvable. Most of the shoes are made from leather, and even the moulded waterproof boots are made from sustainable SEBS rubber.

Function and fit are vital in children's shoes for winter

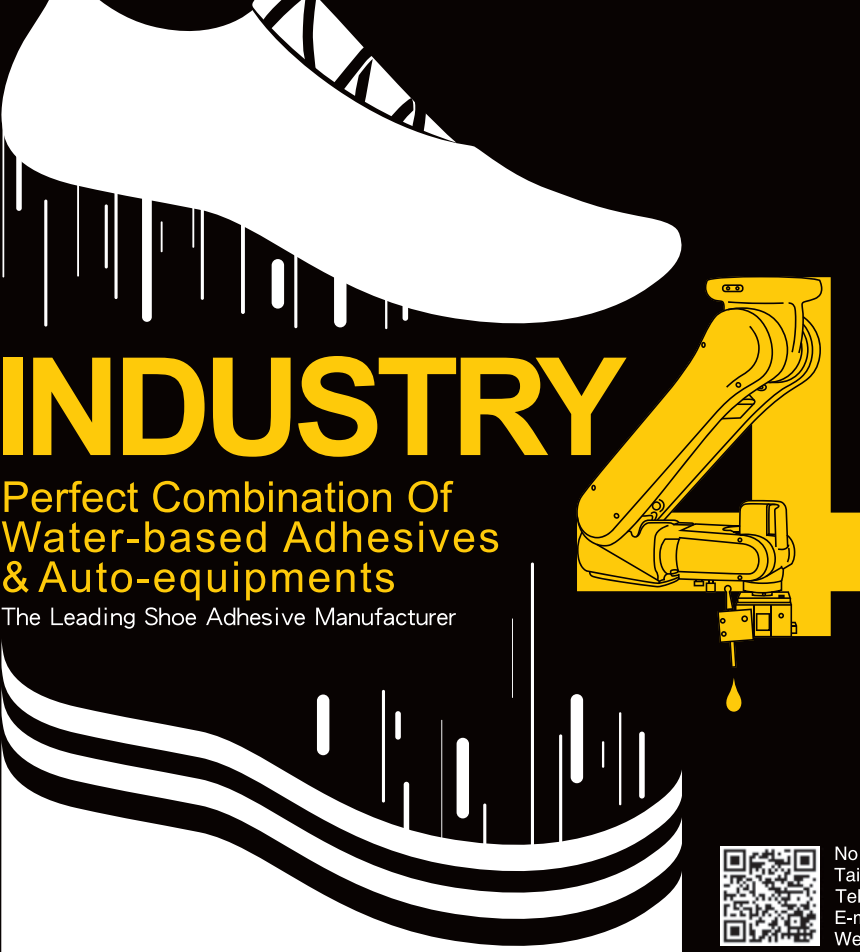


This multifunctional, flexible boot is equipped with a Michelin sole which offers great traction.

CREDIT: HANWAG

sports, and winter urban use as well. Finnish brands like Reima understand this well, as does Viking of Norway. They both make lasts with roomy toe boxes, but have updated them with a trendy sneaker look on the soles and more wintry technical lugs.





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The sole is drawn in 3D layers by a robotic arm.

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Reebok breaks the mould

Under Armour has its Lighthouse manufacturing and design centre in Baltimore, adidas is building a second robot-operated Speedfactory, and Nike has launched the Ease Challenge to find creative new solutions for fastening shoes; the athletic footwear industry is the place to look for cutting-edge innovation. Reebok has now joined the party with the launch of its Liquid Factory project.

Spearheaded by Bill McInnis, head of Reebok Future and a former NASA engineer, the project aims to speed up the development of new footwear products using 3D drawing and a liquid material created by BASF. The formation of the Future team marks the start of a new chapter for Reebok's innovation department as it switches its focus to how and where its products are made.

"We're looking at how we can bring speed, customisation and enhanced product performance to the process of creating footwear; Liquid Factory is a very exciting development in this area," explains Matt O'Toole, president of Reebok.

Robotic revolution

The Liquid Factory is a response to what the brand perceives as a lack of evolution in how athletic footwear is manufactured. "We wanted to fundamentally change the way that shoes are

Sports brand Reebok is aiming to revolutionise the way athletic footwear is made with the help of a new liquid material developed by chemicals manufacturer BASF.

made," Mr McInnis tells *World Footwear*. It uses state-of-the-art software and robotics to draw an outsole using the material developed by BASF; its high rebound capacity makes it ideal for use in athletic shoes. Taking a flat surface as its canvas, a robotic arm precisely draws curved lines using the liquid polymer, building up in 3D layers to create the framework for the sole. Reebok says the result is an outsole with twice the energy return of a conventional rubber one. The framework extends up the sides of the shoe and integrates with the laces; these 'wings' stretch and mould around the foot as the laces are fastened, resulting in a better fit.

The process eliminates the need for moulds, the use of which Mr McInnis calls "expensive and time-consuming". It

makes it much easier to alter or customise designs; instead of creating new moulds, Reebok can program the robots in the Liquid Factory to draw the outline differently. This means design changes can be made in “days or even hours as opposed to months”, he says, adding that “customisation is a huge advantage” of the project. Reebok believes the Liquid Factory will allow it to design and create high-performance athletic footwear faster and more efficiently than ever before. “One big difference you’ll see is the speed of creating and refining product,” predicts Mr McInnis. It will see a massive reduction in the time between the initial product brief and the shoes hitting the shelves; this typically takes up to 18 months. “Our consumer is moving much faster than ever and we need to at least keep pace and preferably stay ahead with what’s coming next,” he emphasises.

Going it alone

Transforming how athletic footwear is made is also high up on the agenda of Reebok’s parent company adidas. In 2014, it announced plans to build the Speedfactory, a manufacturing plant where customised products are created by automated machines. The dream became a reality in 2016 when production began at the facility in Ansbach, Germany. It is almost entirely operated by robots; a small number of human staff monitor the machines, which assemble shoes with knitted uppers and soles containing adidas’ energy-return technology. Large-scale production is expected to get underway this year. Last September, the company unveiled the Futurecraft MFG (Made for Germany) sneaker, the first shoe to be produced at the Ansbach plant. James Carnes, adidas vice president of strategy creation, described its launch as a “defining moment for the industry”. It now has plans for a second Speedfactory in Atlanta, US.

Although the companies are connected, Mr McInnis tells *World Footwear* that Reebok’s Liquid Factory project is an independent venture. While the adidas SpeedFactory focuses on new ways to assemble footwear components, Reebok took the elimination of moulds as its starting point. “The entire industry is spending a great deal of time and effort on how to

create shoes in the future as the existing manufacturing model won’t last indefinitely,” he says.

The Liquid Speed, the first concept shoe produced as part of the project, has already been unwrapped. To take advantage of the improved energy return offered by the sole it is targeted at the running market. The design and assembly was carried out in the US; final assembly took place at Reebok’s headquarters in Massachusetts. It plans to release 300 limited edition pairs. The shoe is subject to the same testing standards as the brand’s other footwear products.

More to come

Reebok is “only just scratching the surface” with the Liquid Factory, according to Mr McInnis. He predicts it will be the start of a “broad new menu” of product development. This phase has focused on developing the outsole but the company thinks the process will eventually be used to create other component parts of performance athletic shoes. The first Liquid Factory manufacturing laboratory will be opened in Rhode Island this year. With an initial capacity limited to the thousands of pairs, the company intends to scale up the procedure so that it has enough machines to satisfy the brand’s standard order quantities.

The head of Reebok Future envisages automation impacting footwear in a similar way to how it has affected the automotive industry. The labour-intensive nature of footwear manufacturing has resulted in many companies relocating their operations to Asia in the pursuit of cheaper labour; he expects increased automation to allow for more “local for local” manufacturing, that is to say shoes for the US market being produced in the US, and Asian factories producing shoes for the Asian market. “Faster, smaller and more local factories can change the landscape dramatically,” he says. It will also bring about a shift in the skills that footwear workers need as they will be required to understand how to program the machines required for the manufacturing process. This is just one of the challenges that Reebok and its competitors face. If recent developments are anything to go by, the Liquid Factory project will be far from the last creative solution they come up with. 🔗



The framework extends up the side of the shoe to improve the fit.

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