

Chattanooga-based Feetz has perfected the technology, sourced the investors, hired the clever employees and is now producing 3D-printed shoes.

This time it's personal

While the footwear world talks about the potential opportunities 3D printing technology could or might bring at some undefined point in the future, Feetz, a company based in Tennessee, has quietly gone about perfecting the technology on its own and is now producing and delivering shoes to customers. Its chief technology officer, Dr Nigel Beard, believes personalisation is the key.

Speaking at the Future Footwear Materials conference in Eindhoven in December 2014, organised by Dutch footwear

innovation and education institute SLEM, Dr Beard pointed out that consumers today go to great lengths to make sure that even a cup of coffee comes exactly as they like it but that, while personalised coffee is commonplace, personalised shoes are impossible for most people to find.

Feetz has responded by developing software called SizeMe, which is patented and will soon be available as an app, Dr Beard says, that lets members of the public capture all the data required to make a pair of shoes (although perhaps not always precisely a pair, more on which later)

Feetz says its shoes are for people who want to take care of their feet, but who feel they currently have little or no choice when it comes to shoes.

CREDIT: FEETZ





Nigel Beard of Feetz presenting at the Future Footwear Materials conference in Eindhoven in December 2014, with Nicoline van Enter, founder and creative director of conference organiser, SLEM.

CREDIT: SLEM

that will fit their feet as well as the best of bespoke. As befits a chief technology officer, Nigel Beard knows what the accuracy variance of SizeMe is: it's between one and two millimetres.

Material options

With the software in place, Feetz next had to find the right soft materials to use to make the shoes. As its shoes come out of a printer, it sources thermoplastic polyurethane (TPU), ethylene vinyl acetate (EVA) and other familiar plastics, but in pellet form. It then applies additives to produce what Dr Beard refers to as "a flexible material that's good for your feet". Additives in use include nano-carbon fibre (to increase durability) and, also at nano level, gold, silver and copper for their antimicrobial properties. There are also ceramic materials, which help the plastic from which the uppers are made to manage moisture better.

"We have around 25 material options at the moment," Dr Beard says. "What we want is to create a palette for designers to use. But it's like a Willy Wonka factory; you can throw whatever you want in there to create a new property. Scented oils, for example. A polymer is essentially a gel, so you can have scented polymers to make the shoes smell good."

He also insists that no compromise on design is necessary. Material surfaces with 3D printing come out smooth, but the footwear company has invested in an electrostatic flocking gun that can spray fibres onto the surface to add visual appeal. Feetz has also developed a technique for incorporating any design or motif on special dissolving paper. Immerse a shoe with the paper in liquid containing "a few special chemicals" and the ink transfers to the shoe when the paper dissolves. It also uses a dissolvable support structure, produced by its printers, within which the upper and the sole are printed.

Production line

Dr Beard is originally from the UK but is at home in Chattanooga, Tennessee, which is where Feetz has its base; he describes it as "a geek city", using the term as a compliment. Chief executive, his wife, Lucy, is also from an IT background. Creativity is clearly in healthy supply at Feetz,

but the company has had to face up to the challenge of making multiple pairs of its shoes cost-effectively enough to become a successful business. It knew its technology worked, but questions remained about how to make it work on an industrial scale. After securing permission to view at close quarters production lines run by automotive company Volkswagen, with each car coming off the line different from the last, Feetz's conviction increased that it could do something similar with 3D printing and shoes. It spent much of 2014 building up seed funding and believes 2015 could be a breakthrough year, commercially, for 3D printed shoes in general and for Feetz in particular.

Nigel Beard can address already most of the questions shoe buyers are likely to want to put to the company. Those concerned about sustainability will learn from him that one of 3D printing's advantages is that it is "zero-waste". The software works out how much material is required to make shoes of the size and in the design required and uses only that amount. Feetz has spent time pondering the possible use of plastics made from polylactic acid (PLA), but has decided against it. The problem, is that, while the raw materials for PLA itself are from renewable resources, the plastics are not reusable at the moment, "and we want to re-use as much as we can", he insists.



Feetz has patented software called SizeMe, which will soon be available as an app.

CREDIT: FEETZ

But he makes it clear to the people he talks to that the biggest advantage is being able to find and buy the shoes you really want. "Fit and comfort are like style," he says, "they are subjective. And if someone says they would like a longer toe-box we can adjust accordingly. If someone else says they want a glove-fit, we can adjust in a different way."

More fundamentally, he believes the Feetz demographic will include people with 'problem' feet, such as those with bunions, those with different-sized feet and so on. "It's people who want to take care of their feet," Dr Beard says, "but who feel they currently have little or no choice when it comes to shoes or no place to go. Our information is that this can be up to 20% of the population. We are targeting people who have a burning desire to solve the problem of finding shoes they can wear." 🌐



With its software in place and a range of soft materials already available for designers to work with, Feetz believes commercial success for its 3D printed shoes is just a step away.

CREDIT: FEETZ

NOT BEFORE TIME

One of the founders of footwear-focused computer-aided design (CAD) software developer Stratégies, Jean-Marc Pedebay, has said he believes 3D printing has an important role to play in footwear production today, but has some doubts about mainstream consumers' readiness to buy finished shoes produced by a printer.

As someone who has been passionate in pushing the use of cutting-edge IT in the shoe industry since the mid-1980s, Mr Pedebay has kept a keen eye on 3D printing, although it is a technology that Stratégies, whose best known product is the Romans CAD application, has not itself developed. A bigger technological breakthrough for his large customers, including major global groups such as Wolverine and Clarks, is that moving data onto the Cloud means designers and range specifiers can access and work on CAD files from anywhere, making response times and the approval process for new designs and new collections much faster. Speed is the key, of course, and it's here that he has seen an important contribution from 3D printing.

"Plastic shoes produced using a 3D printer will not replace shoes with leather uppers in the mainstream market," he says, "but there is a collaborative cycle in the supply chains of most big companies in this industry and it's here 3D printing is playing a part, speeding up what happens at the sample and prototype stage. You send the file by email and your colleague or supply chain partner prints it. You can save around 30% of the time required to produce a prototype. And I can tell you that one organisation that is unhappy about this progress is FedEx. In 2014, FedEx must have earned a million dollars less than it was used to earning from one major footwear group that I can think of, precisely because of this."

He talks of technology as a means of "democratising" the shoe industry. He says he realises that small-scale, individual designers working on their own would be unlikely to find the funds to invest in an expensive software application such as Romans CAD, but with availability online, he envisages a pay-as-you-go future in which companies of all sizes will have access to the smart technology they need, and he says the biggest challenge facing all footwear industry technology providers is to make it as easy as possible for shoe companies to become more high-tech. And when they do, he believes the links between designers, pattern-makers, factories and retail will become stronger, making things better for the person who really counts, the consumer.

"It's about identifying problems and mistakes early," he explains. "This is what has happened in automotive and in the aerospace industry. Those companies spend money up front to avoid delays and mistakes. Delays and mistakes at the time of a launch can prove much more expensive, so they invest to make sure they end up with a product that is right. Footwear has its peculiarities, but it can still learn a lot from looking at other industries."



High levels of IT skills available locally have helped Feetz make Chattanooga its headquarters.

CREDIT: FEETZ