FOOTWEAR TECHNOLOGY: FUTURECRAFT.LOOP

By creating a shoe from a single material, adidas claimed to have made a 100% recyclable product – but it is still some way from a true 'closed loop'.

Futurecraft.Loop takes a stride

Like a scene from a Ridley Scott film, shoe bags slowly descending from the ceiling through dry ice had the desired effect on the hundred or so bloggers adidas invited to a launch event in New York. The idea was to create a buzz around the Futurecraft.Loop, which the German company claims "could be one of the most disruptive products in the world". It worked — most went away and excitedly published stories about its ability to be 100% recycled into an identical shoe. Some of them, plus other prominent sports shoe writers, were even given their own pair, and told to wear them as much as possible and send them back after a month, making them feel part of the research and development process. The shoes are 'made to be remade'... but we must be clear on the finer details before we jump to conclusions.

Destination landfill

It is estimated that of the 20 billion shoes made each year, most will end up in landfill, but as sustainability and waste issues become increasingly important, the idea of cradle-to-cradle or closed-loop recycling systems will gain traction. Given that a typical sports shoe contains around 12 materials and more complicated shoes can include up to 60, this is a big problem for the footwear industry.

Current footwear recycling is based on a somewhat crude system of shredding and separating materials, resulting in pellets of various purities. Dyestuffs are hard to filter out and the resulting granulate is not pure enough for many uses, including footwear – carpet backing and insulation makers are happy recipients.

Adidas' solution is to use thermoplastic

Bloggers and journalists have been enlisted to test the Loops on the street, to help with the R&D process.

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Adidas opted for a dramatic launch event to drum up exitement around the new shoe. Eric Liedtke, head of brands at adidas, said the dream is that you can wear the same shoes over and over again.

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polyurethane (TPU) for all elements of the shoe, vastly simplifying the recycling process – if there is only one material there is no need to sort and it can all be broken down into the same base product.

This idea has been on the drawing board at many companies for some while. Chemical company BASF in 2010 was almost there, with the launch of Pure 1.0 – a concept shoe made solely from polyurethanes, using TPU for the laces, insole top layer, chassis, heel cushion, outsole and logo inlays, and PU for the lower insole, upper and heel. At the time, BASF said it made the shoe to give clients what they needed before they knew they needed it.

According to Paul Gaudio, adidas's senior vice-president for creative direction and future, the company had been considering the idea for more than two decades but the manufacturing capabilities did not exist, until Speedfactory went into operation for Primeknit (knitted uppers) in 2016.

"The guys leading the Speedfactory project reached out and said, 'If we can put things together in a totally new way, we can end up with a completely recyclable product'."

Range of properties

TPU has been used by the footwear industry for decades as it can be produced as a hard rubber, a soft plastic and everything in between. Over many months, adidas' team and suppliers in Asia, Europe and the US worked at refining its applications for the different parts of the shoe.

Its Boost midsole has been made from expanded TPU (e-TPU) since 2013, after supplier BASF discovered a way of turning TPU into a foam, by heating and compressing it to form thousands of minute bubbles that add the 'bounce' and 'energy return'. Boost has been one of the core components of adidas's running offer since then, but it appears adidas has worked with new suppliers for Loop's midsole.

Laces are made with TPU that is soft and rubber-like, the sole needed attributes such as abrasion resistance and grip. The components are fused together with heat, doing away with the need for glue. One of the most difficult parts, according to Mr Gaudio, was to produce a TPU that would knit well for the upper, and would also work on machinery that suppliers were familiar with – although "we can't expect this material to work on existing machines," he adds.

As late as last September, the prototypes they created were not good enough, and the team

In theory, the Loop's components can be melted down to create a different element as they are all made from TPU.

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were doubtful. But they then reached a point were there were very few compromises, if any, says Mr Gaudio, "and that's when we decided to say, 'It's time'."

The caveat: a loss of purity

So, what's the caveat? The current shoes are made from virgin TPU, and by mechanically recycling the shoes (grinding down, and melting the pellets), a vast amount of purity is lost. Given the vigour of the press release and edited promotional video, many bloggers failed to report that this loss means only 5% to 10% of the original shoe will make it into generation two.

"The recycled TPU pellets will no longer have the same quality as the virgin TPU pellets that the first shoe originated from," explains Nicolette van Enter, founder of the Footwearists, a consultancy based in the Netherlands. "Polymers like TPU lose quality as they are processed, worn and then ground up again, so that is why only 10% of each adidas Futurecraft Loop shoe can actually consist of recycled TPU. This means that 90% still must be virgin plastic. And that is after the first cycle - as you recycle the TPU more often, the percentage of recycled plastic in a shoe will probably be even lower."

This is not a bad thing in itself, she says, "Circularity does not have to mean that you take back your own materials and reuse them in the same products. It is essentially about extending the lifespan of a material as much as possible by using it in a range of different products from different companies, based upon the quality it has at each stage."

Design and performance

Using a single material, while having benefits for recycling, also presents drawbacks for design and performance. The 'gen one' Loops are a single colour; adding dyes will complicate the recycling process.

"If a shoe has multiple colours, you will also get a multi-colour granulate and, even if you have mono-colour shoes, you will still have to somehow separate colours in your recycling process, unless you are willing to use this issue as a design feature and end up with only heathered colours," says Ms Van Enter. "You could apply colour recognition sensors in your waste management system, but separating those colours will be tough, because they all have the same density."

She suggests finishing companies could create a new dyeing system that fades over time, which could signal to the consumer it was time to trade the shoes in. She also thinks 3D printing would be an obvious design advantage, as TPU is well-suited to the application and could be used to customise the shoes – something all the big sportswear brands have touted as being significant in the future.

The performance of the shoe has not been discussed, with the shoe in the testing stage, but adidas states they are "designed to meet the adidas sports performance standard, without compromise".

Trading in

Ms Van Enter makes several other interesting observations. She wonders how the company

will encourage customers to send the shoes back. Refunds of $10 and $20 have been mooted, as well as QR codes under the tongue to remind people when it is time. But will the shoes be posted back, or taken into a store? US-based flip flop manufacturer Okabashi encourages customers to send their old shoes back in return for a 15% discount on their next purchase, and its new shoes contain up to 45% recycled product.

"One of the main hurdles for local manufacturing is the lack of locally available materials," says Ms Van Enter, as the components for the Loop are made in China, but assembled at adidas' second Speedfactory, in Atlanta, US. "We do not just want to be able to assemble shoes locally, but also to produce all supplies locally. Only then will products like the Futurecraft.Loop really make sense. Otherwise you still have to ship the granulate of the recycled shoes half way around the world to add virgin TPU and make the parts and then ship those parts back again to be assembled locally. The extra carbon footprint of transportation will then annihilate the environmental advantages of making a mono-material shoe."

She also thinks simplifying the recycling process, so that shops have their own grinder, could be part of the appeal.

"I could even imagine shoes being ground-up in store, turning the process of handing in your worn shoes into something engaging that brings people back into stores," she adds.

Clearer message

While the development heralds a breakthrough, it is important that 'influencers' don't get carried away with the marketing and PR and make sure the facts are clear for consumers. In 2017, Reebok launched its Cotton + Corn 'compostable' shoes; many extolled the shoes you could bury in the garden. When *WSA* quizzed Reebok, it acknowledged the corn-derived Susterra was blended with additives for cushioning and durability and so could not be composted, yet.

Looking beyond the press release to the extended promotional video, adidas conceeds it is at the start of a longer process.

"There's some fine-tuning that needs to be done in the recycling process and in the manufacturing process because the materials it creates are slightly different," says Heiko Schlarb, director of concept excellence.

"It's super-hard, and it will be in the coming months and years as it's just the start of a longer journey," adds Hans-Peter Nuernberg, director of technology innovation.

They also admit there has been resistance within the supply chain, as it "goes completely against the traditional business model" but with cross-industry cooperation, they see it being the norm in 10 to 15 years.

Futurecraft.Loop's launch to the market is scheduled for spring/summer 2021. This gives time to test the performance, refine the processes and the finer details. It might even be long enough to purify the granulate so there is an increased amount of 'gen one' in 'gen two'.

Ms Van Enter sums it up: "It is a significant first step in a much longer process. Until now, people would associate mono-material shoes with Crocs; adidas managed to create a mono-material shoe that looks just like their other multi-material footwear and that certainly is a big achievement."

JRC-REFLEX expands its color range

The retroreflective materials specialist has heeded the call of fashion by developing a new range of on-trend colours for the active sportswear and athleisure markets.

French-Italian retroreflective materials manufacturer JRC-REFLEX has recently expanded the range of available colours in a move to address the growing influence of fashion trends on sportswear and the current fascination for sports seen in fashion spheres.

The company has introduced seven new reflective colours that correspond to key trends. "As the use of reflective fabrics and trimming expands, we felt the need to offer more colours for brands that seek to target crossover fashion and sports uses", says company CEO Celine Cugerone. These new references are available in large width rolls as well as tapes and piping.

For active sports end-uses that require higher levels of breathability, JRC-REFLEX has also introduced a new stretch reflective fabric with perforations that will enhance the comfort of users.

For accessories and specifically bags, the company has developed a new mechanical stretch woven reflective fabric that features improved abrasion resistance properties. This reference comes with a 100% recycled polyester backing material.

About JRC-REFLEX: JRC-REFLEX is a manufacturer of high-quality retroreflective fabrics and trimming. Founded in 1988, the company is based in Romans, France.
Its state-of-the-art factory is located in Bergamo, Italy.
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