Reebok Invents Liquid Factory Tech to "3D Draw" Shoes

Numerous athletic wear companies have been incorporating 3D printing, not just into the prototyping of new products, but into the production of end parts in new shoes. More often than not, giants like Adidas and New Balance rely on existing 3D printing technology to manufacture midsoles for limited edition shoe lines. Reebok, however, has taken to inventing an entirely new 3D printing method to produce components for its Liquid Speed shoe series.

The Liquid Speed shoe from Reebok, made with the company's new Liquid Factory "3D drawing" technique. (Image courtesy of Reebok.)

ENGINEERING.com spoke with Reebok's Head of Future, Bill McInnis, to discuss the new technology, which Reebok refers to as "3D drawing," to get an idea of exactly how the technology will change the way that Reebok makes shoes

A New Way to Make Shoes

With IP dating back about three years, Reebok's Future division began developing its Liquid Factory technique, which was inspired by industrial urethane dispensing systems, roughly two years ago. Implemented in such fields as auto manufacturing, these machines take the manual labor out of affixing gaskets to parts by simply drawing urethane robotically onto components.

. The Liquid Factory technique extrudes BASF-made polyurethane to form the outsole of the shoe. (Image courtesy of Reebok/YouTube.)

The Liquid Factory applies a similar approach, using an industrial robot outfitted with an extrusion system to draw thick layers of polyurethane, developed by BASF, quickly and in three dimensions. "We're essentially

teaching that industrial robot to act like a 3D printer, but using the medium in polyurethane that is right for footwear," McInnis said.

(Link: https://www.youtube.com/watch?v=64XESsTfv_4)

For the Liquid Speed series, of which 300 pairs were produced and quickly sold out on Reebok.com, the outsole on the underside of the shoe and the lacing system were 3D drawn all in a single piece and then attached to the rest of the shoe. The system itself was the result of a collaboration between Reebok, BASF and RAMPF Group.

Local for Local Manufacturing

This process may allow Reebok to not only produce shoes quickly, but also to make them locally and at a lower cost, as it does away with the costly molds traditionally used by footwear manufacturers.

"The Liquid Factory concept is kind of born from the idea of getting closer to our consumers," McInnis said. "When we started to look at local for local manufacturing, one of the big stumbling blocks in doing that was getting over the mold problem in that every shoe on every shelf

is made with molds. Molds are expensive. They're time consuming, and you typically need inexpensive labor to operate them, as well. Inexpensive labor is part of what has moved us into Asia for most of our manufacturing. Then, you have to add shipping to get the product back to our major markets. Focusing in on molds was the main issue."

Reebok is seeking to implement a local-for-local approach to manufacturing its footwear. (Image courtesy of Reebok.)

Instead of focusing on a tagline like "Made in America," McInnis said that Reebok's "local for local" strategy will see products made locally, regardless of the country. "We're a global brand so local-for-local means made in USA for USA, made in Europe for Europe, made in Asia for Asia," McInnis said.

Reebok Future

3D printing has become an increasingly popular approach for many industries, not just in footwear manufacturing, to replace molds. McInnis

pointed out, however, that existing 3D printing technologies may not be ideal for creating athletic footwear.

“3D printing is great,” McInnis said. “It's fantastic for prototyping. We've used it for prototyping in footwear for at least 16 or 17 years, but for us in footwear, it was still too slow, too expensive and it didn’t use the correct materials for us to bring into production and scale.”

In contrast to other 3D printing processes, McInnis said that Reebok's 3D drawing technique is much quicker, due to the fluid nature of the Liquid Factory technique and the thick layers it produces. McInnis explained, “3D printing some of the components, particularly when you get some z height to them, can take hours to make and hours more to process or post-process, whereas there is no post-processing [with our approach] and it's pretty comparable to the time it takes to put material into a mold, heat it up, and fuse it altogether. It fits our manufacturing speed as opposed to having to sort of redefine manufacturing around the slowest piece of it.”

This fits into the more global mission that Reebok Future has for the athletic wear company, which, according to McInnis, is not to come up with new products, but entirely new ways of doing things. “The goal with the Reebok Future Team is to focus on process more than product,” McInnis said. “In the past, I've worked in advanced concepts groups here at Reebok before and it was always very product and output focused, meaning what’s the next big shoe story. With the Future Team, our goal is to take a step back from that and pay attention to who we make things with, where we make them and how we make them, as opposed to what that finished output is. The idea is that, if you change

those three things, you should end up with very different differentiated product as a result."

With the Liquid Factory, Reebok aims to reexamine the way shoes are manufactured altogether. Instead of swapping out existing roles in an assembly line with automated robots, essentially recreating the manufacturing process with robotic equivalents, Reebok intends to look at the most cutting-edge technology that currently exists and using it to manufacture shoes in the best way possible.

"Some of the processes in footwear have been around for 30 years—maybe even longer than that," McInnis said. "They get modified and improved a little bit, but it's essentially the same process from beginning to end. Using this automated Liquid Factory piece at the center of a manufacturing process, we're trying to start with a clean sheet of paper and figure out how you would make a shoe if you could utilize the latest and greatest automation and manufacturing techniques that existed today."

Eventually, McInnis believes that it may be possible to expand on the Liquid Factory concept to create methods for manufacturing a number of different components for the shoes.

The company has begun construction on one Liquid Factory facility in collaboration with AF Group, Inc. in Rhode Island, a half-hour from Reebok's headquarters. Beginning early next year, that facility will begin experimentation and small batch manufacturing in the range of thousands of pairs of shoes. The next step will then be to scale up, which would mean building enough Liquid Factory machines to handle

Reebok's typical manufacturing numbers in the hundreds of thousands or millions of pairs of shoes.

In case not all of the 300 limited edition pairs of Liquid Speed shoes are already sold out, you can head to FinishLine.com and Reebok.com to purchase them for $189.50.

http://www.engineering.com/3DPrinting/3DPrintingArticles/ArticleID/13627/Reebok-Invents-Liquid-Factory-Tech-to-3D-Draw-Shoes.aspx

Chi tiết ô tô

* FDM: Fused Deposition Modeling 熔融擠製成型
(Công nghệ tạo hình bởi từng lớp nhựa nóng chảy)

Sản phẩm gia dụng

Thiết bị dạy học trực quan

Tạo khuôn mẫu

Mô hình kiến trúc

Dụng cụ y tế