Stanford eCorner

A Revolution in Manufacturing

Scott Summit, *Bespoke Innovations*

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Designer Scott Summit, co-founder of Bespoke Innovations, discusses the impact of three-dimensional scanning and printing in the world of product design. This revolutionary technology offers important improvements on traditional manufacturing, says Summit, and provides new avenues for creating customized and long-lasting products and artifacts.

Transcript

But a quiet revolution happened in the maker world about 5 years ago that 3D printing used to be a way to make a disposal product, something that was fragile, that wasn't going to last very long, that was simply a facsimile of something you'd later injection mold. Well, what changed is that 3D printing now can print a physical, solid strong survival artifact. Now that changes everything because now you can print something that will survive, that will solve your problem in that one artifact. And we have seen what happens when 3D printing is in the hands of an artist, you can create beautiful complex structures. You can create things that you can really only imagine any other way. But what also is amazing about this technology is that it lends itself very well to printing one thing per person. It doesn't care if you are printing a million of it or one of it, cost is pretty much the same, unlike injection molding and unlike other traditional means and complexity, which is kind of the bane of the mass production world, complexity is free. More often than not actually complexity is cheaper than simplicity if you make a brick and you 3D print it, it's going to be very expensive. If you make the same volume and it's a bunch of gears, parts and this and that it's going to be cheaper because it's just less material used. 3D printing follows a very different type of math than traditional manufacturing.

So when you take something like prosthetics, which have inherently complex parts and components to them and you apply this thinking, well, now you are allowed to create a leg that is inherently customized for one person and can have great mechanical complexity built into it and it all comes at no extra cost. So, it kind of changes the game. The leg that I have here is shown on the display there on cross section. It shows some of the internal workings that actually nobody has even ever seen because it was printed, it was printed in its entirety. The feature set that you get from 3D printing a leg entirely is, well, you get a ball and socket foot which is, it would be a very expensive component in any other way. In this case, your plantar flexion, your dorsiflexion, your rotation of the foot can make it emulate human motion very accurately, just because your 3D printing it again to the specific needs of that specific person. You can create in this case, it is a seven-bar linkage knee, this would be a $20,000 knee on the open market. It all comes for free because it's just printing it and that emulates human motion very accurately there. You can create tension into it. In this case, it's a very springy, very resilient material and by 3D printing it, you have the contour in the back and the gastrocnemius, which behaves exactly like a human, in the sense that it gives spring force to correct and to redirect the force of the foot.

And finally, your load bearing structure, it's hollow, it's trabeculated just like a bird wing. It's very, very light, so your strength to weight ratio increases because when you are 3D printing a part, you are simply printing the molecules you need and not those that you don't. So, you are allowed to get away with things you can never get away with traditional manufacture.