

Swiss Watchmaking — with 3-D Printing

Jack McGuinn, Senior Editor

For centuries, Switzerland has been considered home to the greatest watchmakers in the world.

Works of fine beauty and optimal precision have been the norm there seemingly forever.

But 3-D printing a Tourbillon knock-off? That actually works? *That's* news. The original Tourbillon was designed in 1795 by French-Swiss watchmaker Abraham-Louis Breguet. Highly prized by watch collectors, it is indeed a thing of beauty in its visual and mechanical execution.

Christoph Laimer, Zurich-based chief 3-D designer for *makeSEA.com* (an independent distribution registry for 3-D print designers) is the creator of this unique timepiece. It was manufactured/printed with a consumer market 3-D printer, the Ultimaker 2; the watch size is 98 mm (diameter) by 93 mm (length). Like, say, the Frankenstein monster, it is not a perfectly working replica — e.g., not very accurate, bulky, and only runs for about a half-hour. Yet it remains, as far as can be determined, the only existing, working watch that is 3-D-printed — including *every* gear. What's more, Laimer's creation took top prize at last year's Piemonte Share Festival. And for you at-home 3-D printers, you'll be thrilled to know that Laimer's source files for his 3-D model Tourbillon are available online free of charge (*Thingiverse.com*).



Following is a brief interview with Laimer — the creator of the first 3-D-printed mechanical watch.

When did your fascination with 3-D printing begin?

2013 — on a business trip. After a hard day working as a software engineer in the factory, back at the hotel I was browsing the web for 3-D printing. When I saw the button "Buy Now" it happened that my index finger did an uncontrolled movement. Back home, the heavy box with the kit was already waiting for me. My first real project was a "normal" clock (go to youtu.be/HgZBPYJ2Y-w).

What compelled you to focus on 3-D full time?

I was working as a software engineer and manager for almost 20 years, and I still loved my job. Either I get retired at the same company, or I need to look for another company. Plan C was a break, and focus on hobby and



family. So I constructed the Tourbillon. It wasn't my plan to make it a new profession.

At risk of appearing flip, how does one make a living at this? It seems more like a fun hobby than a commercial enterprise. Do you consult/do any industrial-type prototyping of, for example, gear or other components design?

It's still not sure, if my new profession has a future. I was lucky that I got a big work order from a U.S. company to create a whole set of 3-D-printable objects (www.makeSEA.com). I'm also lucky that my wife has a permanent part-time job, so the finances are not as critical. Certainly I'm using my time to get experienced in using CAD-tools, and extend my knowhow as a mechanical engineer. The required expertise for profiting from 3-D printing is much different than the traditional machining knowhow. So I'm hoping that my new knowhow extends my options for any new job.

A recent online article says "your belief that future watches will be highly customizable — not only engraving, ornaments or decoration, but very complex objects combining mechanics and electronics — has led (you) to explore and push the boundaries for 3-D printing." Can you expand on the "explore" and "push" parts?

Many published 3-D printing projects are decoration: vases, boxes, sculptures, etc. Just one, single mechanical block — and hence limited functionality. So far, 3-D printing was mainly used for visual prototyping. But that's not the limit of the 3-D printing technology. Today it is possible to 3-D-print complex mechanical objects in plastic or metal, and to use these objects as final product. My watch is a demonstration for this. Of course the 3-D printing technology is not useful for cheap, mass-production. Injection molding will always be much more efficient for producing thousands of identical items. (But) it is possible to design parametric mechanical models (that enable customization). To 3-D-print such a custom model is much cheaper than crafting it by hand. (*Primary source for this article: Jan. 12/16, "Introducing the World's First Fully Functional 3-D-Printed Watch: The Christoph Laimer Tourbillon," by Nicholas Manousos at HODINKEE.com.*) 