

Materials Decisions Critical to New Watch Design

Dave Mast, Solid Concepts Inc.

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Devon Works has developed a bold new look for its sports watch. The company's first step toward making this watch a reality was to move beyond the CAD image and develop a highly accurate prototype.

When Devon Works decided to create a new timepiece, the company knew that mere attention to detail would not be enough to make it different. They had to think entirely out of the box and go beyond the idea of what a watch is supposed to look like. With this no-holds-barred approach, Devon Works decided to do something bold, something exciting, and something that would stand out and be noticed.

“The idea (of moving beyond the standard watch design) has been around for a while, and this was the perfect time to finalize the work and put it on the market,” says Jason Wilbur, director of design at Devon Works, and the lead on the Devon watch project. “We produced the 3D CAD drawings, but that wasn’t enough to give us the true sense of the impact that the real watch would have.”

Design inspiration for this luxury watch came from industrial conveyor belts and motorcycles. Called the Tread 1, the original design for the watch was completed using SolidWorks 3D CAD software. The virtual drawings were a great starting place, but didn’t have the impact that a prototype would offer. “We needed to have a real watch on our wrists because, without it, we knew it would be difficult to get the new concept across,” Wilbur says.

As the lead on the project, Wilbur was intimately involved in the design of the watch, which features an interwoven time belt system rather than a digital readout or circular analog dial. “We went outside the boundaries of what a watch is supposed to look like,” he says. The series of belts indicates hours and minutes in exacting motion, while the belt indicator for seconds runs continuously. In the final, real, version, accu-

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An exploded view of the Tread 1 watch assembly.

racy is assured using a proprietary optical recognition system that monitors each belt position. For the real watch, the belt assemblies would be mounted on a central chassis that allow for perfect clearance of the moving parts, as well as to create the illusion that the parts are floating within the case.

One striking aspect of the Devon watch does is its five-piece case design made from high-grade stainless steel.

“The aesthetics of the timepiece were designed around a combination of technologies, which meant that we needed to use multiple technologies for the prototype as well,” Wilbur said. A total of five prototypes were built to assess design ergonomics and to help as a sales tool to get retailers interested in the final product.

“This project wouldn’t even have gone over without using a prototype. You just can’t explain what this watch looks like. It’s so far out of the normal idea of what a watch is,” he

says. “But, when you pull up your sleeve and they see the full power of the timepiece, selling it becomes secondary.”

Prototype Creation

Devon Works contracted with Solid Concepts Inc., based in Valencia, CA, to produce all five of the watches.

To create the watch, Solid Concepts not only had to use multiple types of machinery and materials, they also provided post component finish work including polishing, micro-finishing, laser cutting, screen printing and anodizing.

To manufacture the prototypes, the outer case, watchband links, band clasp, tuning knob, and back plate were all CNC machined from aluminum. Of course, the smaller the parts that have to be fabricated, the more important finished part tolerance becomes. The watch not only had to be made out of the right materials, all the pieces had to fit together perfectly. After machining, Solid Concepts polished anodized each of the components. The Devon logo was laser cut from 0.020-inch aluminum, brushed, and silkscreened. Each of the four belts (one belt for hours, two belts for minutes and one for seconds) was silkscreened with the number graphics on black vinyl, then hand trimmed to size. The belts were stretched into place and wrapped around the internal components where they were bonded into place.



To create the watch prototype, Solid Concepts had to use multiple types of machinery and a variety of materials.

All the other internal components were made using the company’s PolyJet rapid prototyping process, then finished and painted to give them a metal-like appearance. Each piece was located and bonded into place according to the CAD data received from Devon Works. The watchband itself was made using PolyJet master models and then QuantumCast with shore 90A urethane rubber. The watch crystals were CNC machined clear acrylic, and hand polished to optical clarity. Internal and external screws were purchased from a specialty vendor.

The final watch looks exactly the same as the prototype. The only difference is that the components move as they were designed to do. The belts are driven by compact microstepper motors, one for each of the four belts. A lubricant-free pulley system moves freely via the integration of jeweled bearings. A temperature-compensated crystal provides data to the onboard microprocessor that drives the motors, all powered by a lithium polymer rechargeable cell. On the final watch, the window into the mechanical movements is a crystal produced from scratch-resistant and anti-reflective polycarbonate with bullet-proof durability.

“It takes a trained eye to tell the difference between the final manufactured timepiece and the prototypes we had built,” Wilbur says.



Post component finish work for the prototype included polishing, microfinishing, laser cutting, screen printing and anodizing.