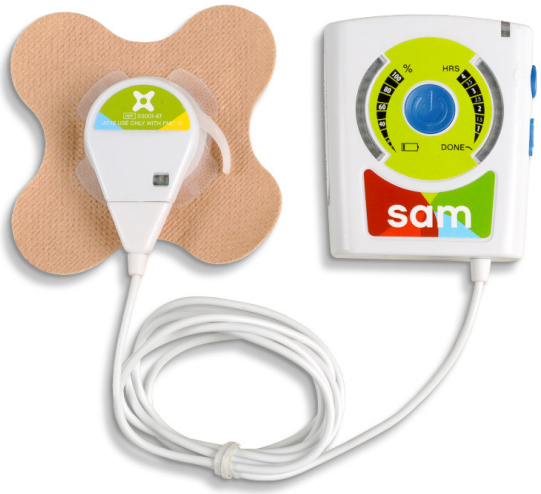
Small company, big impact:

ZetrOZ uses CCAT 3D printing expertise to redesign breakthrough ultrasound device



The original sam® (Sustained Acoustic Medicine) device was redesigned by ZetrOZ to be more rugged and aesthetically pleasing.

Not long ago one of the realities of the medical device industry was that a company had to have a large footprint to reach the market with an innovative product.

But an emerging generation of small companies is using a laser-focus on their product niche and new technologies such as 3D printing to break through the barriers of the past.

ZetrOZ is a prime example. The company, privately funded with about 20 employees, late last year introduced sam®, the world's smallest ultrasound therapy system that provides an alternative to pharmaceutical-based pain treatments.

sam stands for Sustained Acoustic Medicine, a suitable name for a device delivering long-duration, continuous ultrasound therapy that's completely drug-free and cleared by the FDA. According to ZetrOZ, the deep-penetrating ultrasonic therapy—available only before in large, expensive machines located in the offices of healthcare providers—reduces inflammatory pain, relieves muscle spasms, improves joint and muscle flexibility, and increases local circulation.

3D prototypes like the real thing

After nearly a year on the market, ZetrOZ needed to design a new version of sam, with the emphasis on making the casing for the device more aesthetically pleasing, both to the eye and the touch. ZetrOZ also wanted to ensure that sam can withstand the rigors of everyday use in a home environment, which could include everything that typically happens to a cell phone: people sitting on it and dropping it, cats playing with it, dirt, dust, humidity, moisture—you name it.

The updated design work was done with help from the Connecticut Center for Advanced Technology Inc. (CCAT) and a funding grant through Connecticut's Manufacturing Technical Assistance Program, a state-legislature supported program.

CCAT uses the ProJet® 5500X printer to quickly produce multi-material prototypes that are not just approximations of actual products, but that look and feel exactly like injection-molded parts.

"The ProJet 5500X is a unique 3D printer," says Eric Wold, CCAT machining applications specialist. "It has the ability to blend materials within a single part build. It is especially good for parts with over-molded features, such as a rubber grip on the outside of a handle or case."

For ZetrOZ, the over-molding capability is critical for creating a rigid case that provides a comfortable, tactile feel.

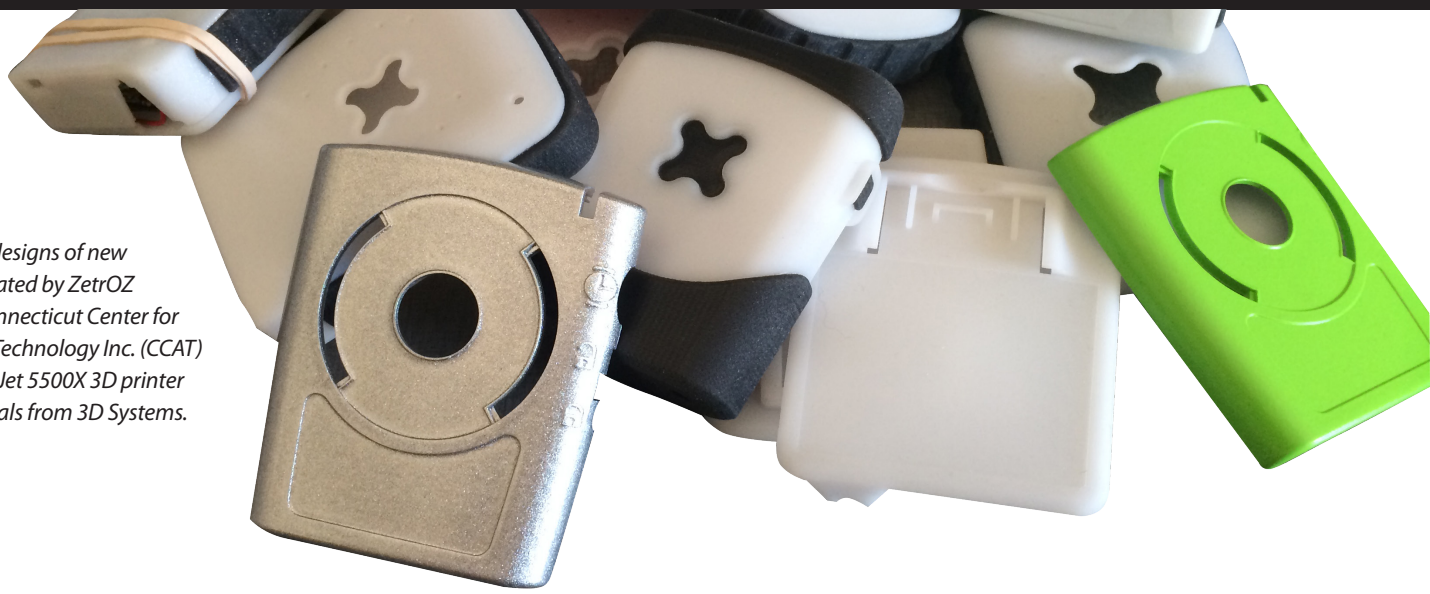
"Working with CCAT and its 3D Systems' printer gives us access to a wide range of printed materials," says ZetrOZ's Eric Kolb. "We can experiment with different material properties for strength, flexibility, surface finish, comfort and resolution."

CCAT has developed sam prototypes using three different materials from 3D Systems: VisiJet CR-WT, a white, ABS-like material; VisiJet CR-CL, which is clear and has the translucence and strength of a polycarbonate; and VisiJet CF-BK for the over-molded areas that require a rubber-soft gripping surface.

Iterations in half the time

Over the past several months working on the new version of sam, the two Erics have leveraged 3D printing technology to forge an easy-going, clearly defined relationship.

"Basically I send a SolidWorks CAD file to Eric and he does the rest," says Kolb.



Prototype designs of new casings created by ZetrOZ and the Connecticut Center for Advanced Technology Inc. (CCAT) using a ProJet 5500X 3D printer and materials from 3D Systems.

Wold converts the CAD file into STL format and loads it into 3D Systems' 3DSPRINT software to lay out the parts on the ProJet 5500X build plate. When the parts come out of the printer they are placed in an oven to remove wax used during the build process, cleaned with mineral oil in an ultrasonic machine, and gently washed with hot water and a mild soap.

ZetrOZ is refining a favored design and materials after about six vastly different design concepts were considered. It takes about a week, including shipping, for CCAT to return a 3D-printed prototype for each iteration, according to Kolb.

"If we were using a traditional injection-molding process, each prototype could take eight to 12 weeks to build and we'd probably only have time and money for one design iteration," says Kolb. "Some new molding processes can reduce that time to a couple of weeks, but that's still twice the time it takes us working with CCAT and its 3D Systems equipment, software and materials."

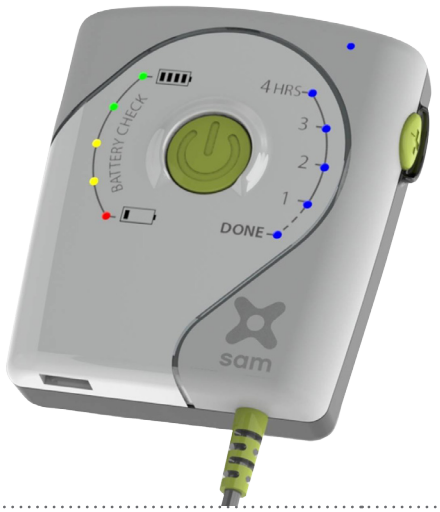
"The quality and the detail of the [ProJet 5500X] 3D printer are amazing," says Wold. "We have had people visit our facility who have been 3D printing for years and they cannot believe the fine details the printer is capable of. Parts that come out of the printer look like finished production parts, not 3D-printed prototypes."

Skin in the game

The new, improved version of sam is not just a professional concern for ZetrOZ's Kolb. As a runner and triathlete who has suffered from chronic injuries, Kolb is using sam to get back in shape for future competition. He's benefiting from the controlled-release, long-duration treatment provided by sam, using the device up to four hours a day, five days a week.

"In the past I've never been able to use products I've worked on because they were for surgical procedures," says Kolb. "It's nice to be designing something I can touch and operate as an end user."

Kolb expects that the more rugged and cosmetically pleasing sam will be released in the first part of 2016, providing another example of how, with the help of 3D printing, big ideas from small companies can come to market faster and less expensively than ever before.



A SolidWorks rendering of the anticipated final design for the next version of the sam® device.