

HEALTHSENSE SLASHES TIME-TO-MARKET

With Protomold and First Cut Prototype

Mechanical Designer Dave Anderson of Healthsense™ was initially cautious in approaching Protomold®, a division of Proto Labs, Inc. He had been aware of the company for several years before becoming a customer, but has since become a fan of both Protomold and First Cut Prototype®, another division of Proto Labs. “I’d been seeing Protomold ads in design magazines for several years,” says Anderson. “Their prototyping and production services were clearly faster, more flexible, and less expensive than other comparable prototyping processes we were seeing, but I didn’t fully understand their process.”

About three years ago Anderson went to Protomold’s web site and took a closer look at ProtoQuote®, the company’s free online quoting tool. “I uploaded a CAD model to ProtoQuote and was very impressed with what I got back,” he says. “Within a day I had a detailed, interactive online price quote along with feedback on the moldability and design of my model. While viewing the quote, I could adjust parameters like finish, resin, and part quantity and the pricing changed to reflect the new input while I watched. Their quoting process is huge. With the vendors we had been using, you’d get a static one-page price quote. If you wanted to change something, you had to start all over, and unless you were talking to an engineer you didn’t get any design feedback at all. In my job I wear a lot of hats, so I’m not a specialist in plastic parts design, but Protomold let me submit designs and through their ProtoQuote 3D viewer they pointed out areas where I could adjust and improve the design.”

Healthsense, located in Mendota Heights, Minnesota, is involved with senior living facilities providing independent living and assisted living services. The company is also involved in services designed to allow older individuals to stay in their own private residences as long as possible. The company’s technologies help improve quality of care, reduce the cost of providing care, and increase staff efficiency. Healthsense Integrated Solutions provide facility-wide

WiFi coverage, wireless nurse call, ADL monitoring, fall detection, access control, and wander management. The company’s eNeighbor system is an automated emergency response system that helps individuals remain in their homes by automatically calling for help if the senior cannot, providing coverage of the entire residence 24 hours a day, and providing information on the health of the senior.

“The goal of our technology is to provide the highest level of service to residents while holding down costs to the facility and the social service systems,” says Vice President of Research and Development Dan Vatland.

“Our core technology involves active sensing of signals from an emergency call pendant worn by the resident. Within a care facility, the pendant sends out a radio frequency signal and the location of the resident can be determined by triangulation across multiple WiFi Access Points. The request for help is then forwarded over the Internet to the Healthsense 24-hour data centers. The request is then transmitted back to on-site responders and monitored at the data center. The call pendant request is color-coded yellow when the button is pressed and red when acknowledged by on-site responders; it remains red until the request is responded to.”

In 2006, Healthsense rolled out eNeighbor, a new platform developed with a grant from NIH and directed toward helping seniors “age in place.” The grant was originally designed to bring technology into homes in rural areas to help seniors remain independent longer. Under this program, various kinds of sensors — motion sensors, chair sensors, bed sensors, and contact sensors — are placed around the user’s home or apartment to monitor the user’s activities. The system is non-intrusive and watches for anomalies like unusually long periods of inactivity. In such cases, the system can automatically generate a call for help, which is sent to a neighbor who can check on the user. As a side benefit, the system can monitor activities of daily living, identifying changes in eating or sleeping patterns.



"We first used Protomold in 2007 when we introduced the eNeighbor system," says Dave Anderson. "We knew we would be redesigning the product fairly quickly, so we didn't want to invest in expensive steel molds, but we needed a product we could take to market. We had Protomold make shells for 1000 pendants, including several parts for each of two slightly different versions. Protomold was able to deliver them quickly and at an affordable price, allowing us to introduce the product while we were still fine tuning the design. That was when we started working with the quick-turn CNC machining division of Proto Labs called First Cut Prototype."



"We hadn't used First Cut before, but we had received emails about their service," says Dan Vatland. "We needed prototypes we could test for functionality, but we only needed five sets of parts, and First Cut seemed like the ideal source. Their price was reasonable, they could produce parts in as little as one day, and their parts had all the characteristics we needed for functional testing. We also considered Protomold, but the number of parts we needed was small and the design also required overmolding, something not supported by the Protomold rapid injection molding process."

"First Cut's machined prototypes cost a little more than FDM (fused deposition modeling), but it was easy to justify the difference in price. First Cut offers a wide variety of materials, and their polycarbonate material was very similar to the production material we planned to use. That allowed us to do things like perform the emissions testing required by the FCC, which we wouldn't have been able to do with FDM prototypes. Choice of material is one of the key advantages of First Cut's process."

The working prototypes from First Cut were thoroughly tested. "Since the devices we were designing are made for critical applications, we had to look very carefully at every aspect of their operation," says Vatland. "The shell of the new device consists of multiple parts: the front and back halves of the shell and a battery clip. It was a complex design with snaps and clips, and along with fit we had to confirm details like water tightness. We also had to make sure the screws would hold and be certain that the circuit boards would be held tight within the shell and that the battery spring clips would hold the batteries without deforming the shell."

"In addition to our own testing, field testing was done by other companies that worked with us on the project. Some of the prototypes were examined by potential end users, so, in addition to functional issues, we got feedback on "aesthetic" issues — whether the button felt right and the weight was acceptable. Because First Cut's parts — the shell segments of the pendant—comprise much of the interface between the device and its users, we were able to get information on both 'look and feel' and real-world performance. FDM parts are too rough for a lot of those tests, and SLA (stereolithography) produces parts that are too brittle and too weak when compared to the actual polycarbonate production parts."

"We have nothing against rapid prototyping processes like FDM and SLA," says Dave Anderson. "We've used them all, and each one has its own place. SLA is quick and inexpensive and can be used to determine initial fit and line up of parts. You can sand and paint it for a reasonable approximation of finish, but you can't use it for functional testing. We thought we might be able to use FDM for functional testing, but in this case, that turned out to be a mistake. FDM uses an ABS-type material and the result was that some of the finer features didn't hold up. For example, the clips on the FDM model had a tendency to break off. First Cut's machined polycarbonate parts had no such problems. They gave us the information we needed and pretty much verified our design. Based on our functional tests, we made some minor changes to the button itself and went straight to production with steel injection molding tools."

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"We would be very likely to use both First Cut Prototype and Protomold again in the future. Because our testing processes require relatively few prototypes, we would probably tend to use First Cut for the initial prototypes. They can make parts in almost any resin we would need and have the strength and finish for functional testing. Then we would almost certainly contact Protomold if we were in a time crunch and needed low volumes of production parts while we were waiting for steel tooling. Used together, First Cut and Protomold give us the ability to very quickly get our prototype and low-volume production parts made in a wide range of resins at reasonable prices."