EAC

MINNETRONIX MEDICAL

Saves Money by Using Formlabs Form 2 Printer for Production

CASE STUDY

BUSINESS OVERVIEW

Minnetronix Medical, Inc., founded in 1996, is a global leader in medical technology. The company partners with device companies across the globe to rapidly develop innovative and cost-effective medical products in these specialties: RF Energy, Fluid and Gas Management, Optical Systems, and Stimulation and Active Wearable devices. Their business also designs, develops, and manufactures novel treatments in neurocritical care.

Minnetronix is expanding their headquarters in St. Paul, Minnesota to 170,000 square feet while also adding about 75 new jobs. These additions also include a Digital Manufacturing Center of Excellence (DMC) – a lab where subject matter experts can guide internal projects and ultimately maximize engineering and manufacturing resources within the organization. The DMC lab is also where prototyping, design iterations, and production will take place with their in-house 3D printers.

BUSINESS CHALLENGES

The engineering applications used at Minnetronix range from prototyping, fixturing, and tooling for various medical device parts. Their customers send over digital industrial design (ID) models with a need for a physical 3D printed part to help further decision making in the early design phases of product development. If the design is approved, then manufacturing the part can take place. If the design is not approved, this may require multiple design iterations until the customer is satisfied with the outcome – which can be time consuming and expensive.

Engineers at Minnetronix were using a Photon (DLP) printer as well as a Stratasys (FDM) printer for early design iterations and proof of concepts for their customers. The DLP printer proved to be inconsistent with end result prints and the FDM printer materials were too expensive and didn't match the quality that the engineering team was looking for.

If printing in-house wasn't an option, the prototypes would have to be outsourced. In one case, engineers outsourced a part (the size of a small suitcase) that cost $60,000 for a single prototype. In another case, the cost for an outsourced part that needed a little more aesthetic detail (the size of an iPhone case) was $1,000. Outsourcing was no longer an affordable option for the copious design iterations needed during product development.

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Rick Beddoe, a Mechanical Engineer at Minnetronix, says "We deal with a lot of early iterations of products from customers who send us Industrial Design images, and they ask us to print. When we printed in-house, it didn't look like the ID. That was a challenge. To get that kind of work outsourced, we would have to send the work to a model shop or an ID firm that specializes in that kind of work - which was incredibly expensive." There was a need for an in-house 3D printing solution that was more consistent, affordable, and higher quality.

SOLUTIONS

Minnetronix compared 3D printers in the market and highly considered the re-occurring cost of materials since there were multiple iterations in their design process. When comparing Markforged (CFF printer), Stratasys (FDM printer), UltimakerS5 (FDM printer), and Form 2 (SLA printer), they found that the cost per cubic inch of material for each printer was $6, $5, $1, and $3.50, respectively. Their other consideration was the cosmetic component of 3D printed parts since it was important to show their customers fine details of what the final product may look like.

After analyzing their options, they chose the Form 2 to fulfill the solution requirements they were looking for. The Form 2, an affordable desktop 3D printer (only $3,499) made by Formlabs, over exceeded print detail expectations for the engineers at Minnetronix. Beddoe states,

> When we got the Form 2 we printed everything we could possibly print. We found that we could print some really amazing work with it.

We could print mock-ups of a circuit board. That's huge for us."

After purchasing directly from Formlabs for their first Form 2 printer package, Minnetronix decided to partner with a local Formlabs commercial reseller, EAC Product Development Solutions. Lauren Adey, the Additive Manufacturing Specialist at EAC, is a subject matter expert in Formlabs printers and was able to work closely with the engineers to provide quick service and support when ordering new equipment and materials.

One of the coolest things we used the Form 2 for was a lens that was less than a millimeter in diameter. We used the Formlabs printer to prototype these lenses, and that was pretty spectacular. We were looking for smooth finish and detail," says Beddoe. After seeing the Form 2 perform beyond expectations, they soon purchased a Form 3 (upgraded version of the Form 2) and Form 3B (specialized for biocompatible resins).

THE RESULT

Formlabs printers gives Minnetronix a competitive advantage in the market by giving the engineers more control over how quickly they iterate and how uninhibited they are to make changes throughout the design process. Beddoe says, "We are able to 'fail faster'. Because we could iterate, we could uncover discrepancies and shortcomings faster – we're not wrestling with that in production. We've already solved that in prototyping as we iterate. A lot of that has to do with the accuracy of our prints. It's something we depend on."

Beddoe adds, "By printing in-house, we don't have to wait 6-8 weeks for tooling. In some cases, tooling can even take longer. Without having a Formlabs printer to iterate, there is a lot of back and forth with tooling vendors. We couldn't afford to have the extended wait time for the tooling anymore to stay ahead of the game."

On an average project that requires

tooling, Minnetronix engineers are able to save 6-8 weeks lead time using Formlabs printers. By delivering faster turn-around time due to using multiple Formlabs printers in-house their customers are benefiting by having a physical model in their hands much faster than if they outsourced.

“I got a call from a sales rep who needed an example of a prototype to show a customer. We didn’t have anything on hand, but I told him I’d get him one. I created a model in SOLIDWORKS and sent it to print on the Form 2 overnight. When he came in the next morning, the prototype was on his desk. He took it to the customer in less than 24 hours. The customer asked our rep where he got it, and he replied, ‘We just made this for you today.’ It’s really impactful to be able to do something like that. Ultimately, I’d love to expand that capability to knock the socks off more of our customers.

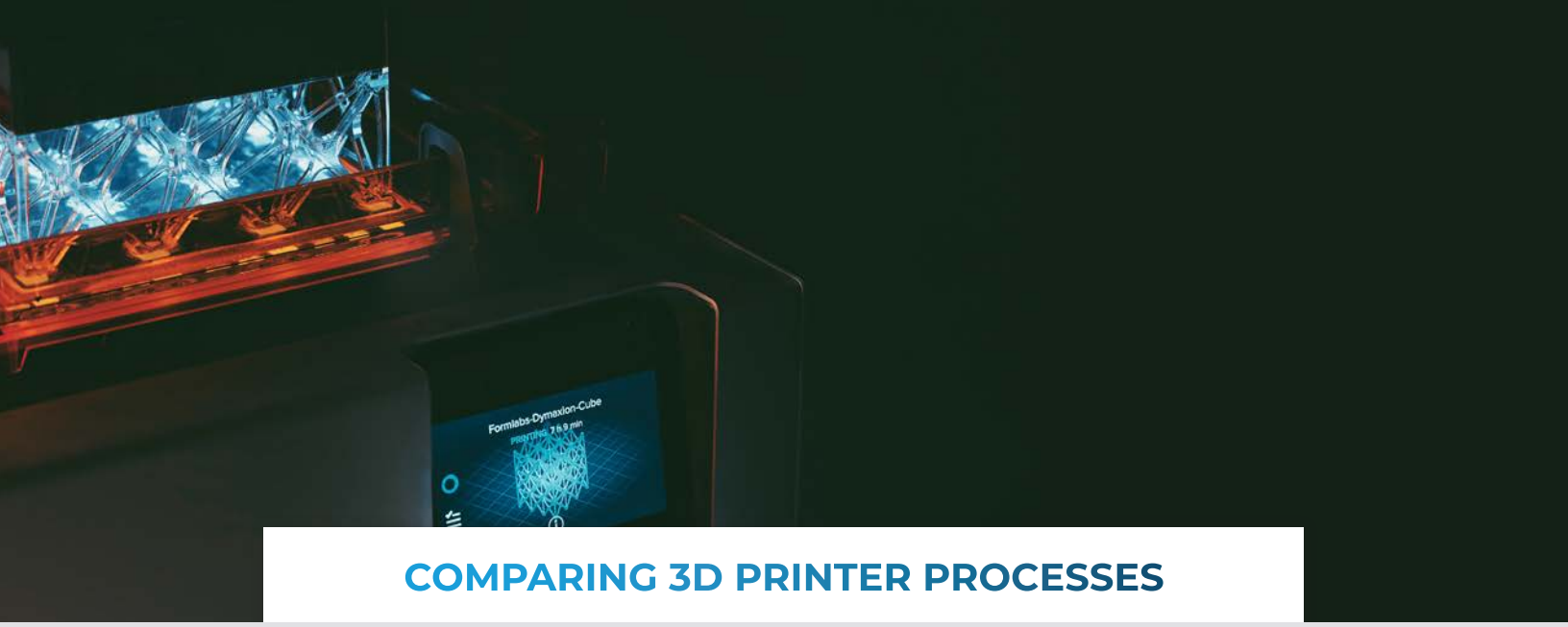
“By advancing their 3D printing technology, Minnetronix is able to cut down on material costs, increase time-to-market, and provide quicker turn-around for customers. Beddoe replies, “Ultimately we want to make life better for our patients and customers.” And so, they have.

MINNETRONIX SAVES $10,000 BY USING FORMLABS:

Engineers at Minnetronix needed to manufacture a small part, a plug, for a medical device that detects pressure ulcers for patients. If they were to manufacture these, this meant they would need to create an injection molding (tooling) that would cost $8,000 with an additional $2,000 for materials. Instead, they used their Form 2 to print 50 parts at a time (5 hours, 23 minutes print time) on the Form 2 build platform – which was enough to supply their assembly line until the rest were printed.

Rick Beddoe says, “We are using the Form 2 for production. A lot of people are using their 3D prints for prototypes, fixturing, iterative design -but in our case we are using the components we create from the Form 2 as a final part that goes into a product that is used directly in the field.” He says he’s considering using the Form 3L, which has a much bigger build volume, to ramp up production since they could fit around 200 of plugs per print rather than 50.

Around 500 plugs were 3D printed for this project. If more are needed in the future, they can be printed on-demand. By not having additional inventory (manufacturing in-house) or having to reach a minimum order quantity (outsourcing to a model shop), Minnetronix was able to save around $10k on this project by producing the final part on their Formlabs printer.



COMPARING 3D PRINTER PROCESSES

Digital Light Processing (DLP):
Great for complex models; faster print time but with less accuracy and consistency; most affordable; great for dentistry, jewelry, and hearing aid applications; usually compared to SLA.

Fused Deposition Modeling (FDM):
Great for basic proof of concept models; faster print time; more expensive;usually for larger, simpler, and more functional prototypes.

Continuous Filament Fabrication (CFF):
Great for lightweight, strong models; carbon fiber-reinforced materials; most expensive; for applications that rely on performance of material.

Stereolithography (SLA) + Low Force Sterolithography (LFS):
Great for detailed models; slower print time but with more accuracy and resolution; wide range of applications; more affordable; usually compared to DLP.