

61-Year-Old Company Re-Invents Itself With FDM

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— Matt Hlavin, President, Thogus Products

Established as Master Mold & Die in 1950 by Jack Thompson, Thogus Products (Thogus) is a 61-year-old manufacturing company foundationally rooted in injection molding. In 1997, 56% of sales came from automotive clients. A decade later, feeling the pressure of a poor economy and recognizing the threat of limited diversification, Thogus decided to search for new sources of revenue.

FINDING STRATASYS

By the time Matt Hlavin, grandson of Jack Thompson, became president of Thogus in 2008, he had been following Stratasys – a maker of additive manufacturing machines for prototyping and producing plastic parts – for nearly 10 years. Intrigued by the product development capabilities of Stratasys technology, Hlavin had found his solution and a direction for Thogus. Hlavin decided to shift Thogus' focus to small-volume molding and highly engineered materials using Stratasys Fused Deposition Modeling (FDM) systems. Moving to small-volume production positioned Thogus to compete with high-cost fabrication shops due to its new lean, nimble manufacturing process. "One of my first major decisions as president was to purchase two Fortus 400mc machines to aid in product development and provide more value to our clients," recalled Hlavin. "Stratasys technology uses the same thermoplastic materials we use in injection molding, and we can produce product parts in small volumes until our clients justify the production tooling, which is very expensive."

Before even having his first Fortus 3D Production System in-house, Hlavin's vision had been validated by Stratasys: "We had ordered an FDM machine, and Stratasys agreed to make parts for us before our machine arrived. One of our clients needed a part made for a customer project, but the part could not be manufactured as designed. So, our engineers redesigned it. We then built their original part and our redesigned part and took them to the client. They were floored. When our client's customer came in from out of the country the following week, our client was able to close the deal. Which meant we had won a \$600,000 program. Before even having our machine in the building, Stratasys helped us close a program that paid for our first machine."

How Does FDM Compare to Alternative Methods at Thogus?

Part/Tool	FDM	Alternative method
End of arm robot	\$600 24 hours	\$10,000 4 weeks
Automated turntable	\$8,800 Weeks	\$50,000 8 weeks
Steel plates	\$20 / 2 hours	\$200 2 weeks

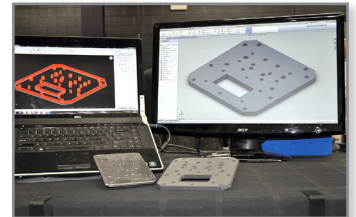
Quickly realizing a return on his initial investment in two Stratasys machines, Hlavin went on to invest a few million dollars in advanced technology, capital equipment and automation, including two Dimension SST 1200es 3D Printers, a smoothing station and a Fortus 900mc 3D Production System. "We were so confident in Stratasys, we purchased every material that Stratasys offers – ABSplus, ABSi, ABS-M30, PC-ABS, PC, Ultem 9085 and PPSF/PPSU – in order to handle the concept ideation, functional prototyping, prototype tooling, filtering, end of arm tooling and final production demanded by our clients," said Hlavin.

SUCCESS IS IN THE NUMBERS WITH FDM

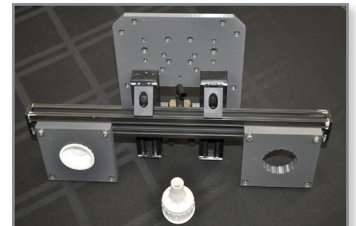
Since 2008, Thogus has grown to 86 employees, 31 of whom were hired in 2010. In 2010, its revenue increased 76% over 2009. Thogus largely credits the drastic growth to Stratasys FDM Technology, which the company has used to develop a manufacturing solution that streamlines the production process, passing along those savings to clients. The philosophy is simple, and universal.



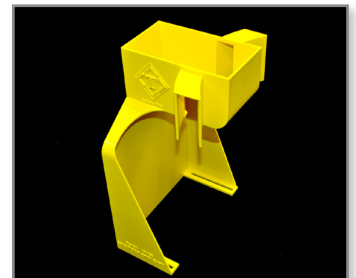
rp+m's hub of innovation located within Thogus Products Company: Two Fortus 400mc machines a Fortus 900mc machine.



End-of-arm mounting plate



Automation tool/end-of-arm tool



Safety guard for secondary services

"Low price wins," said Hlavin. "We'll give away parts with quotes, which is virtually unheard of for an injection molder. That's how confident we are."

In January 2009, Thogus didn't have a single engineer on staff. Today, the company employs 15 engineers in the plastics, civil, mechanical, biomedical and chemical disciplines. "By bringing engineering into the business, our clients develop products faster and more efficiently," he added. Hlavin envisions Stratasys' FDM Technology as the future of plastics processing, manufacturing and product development. "We are at the dawn of a mass customization economy – have it your way, in small volumes."

UNCONVENTIONAL WISDOM

Vitamix, maker of commercial blending machines, was purchasing SLA prototype parts from local service bureaus when Thogus introduced prototype parts made with real thermoplastics. "We showed them what our machines could save them in terms of time and cost," said Hlavin. "They loved it because the parts were much more robust, and they could do functional testing with our parts."

Hlavin even encouraged Vitamix to buy its own Stratasys FDM machine. And they did. "Every project is urgent at Vitamix, so now we handle all overflow orders the company doesn't have capacity to fulfill in-house. Since the machines speed up the manufacturing process, we're actually getting more work from them than before."

STREAMLINING MANUFACTURING WITH FDM

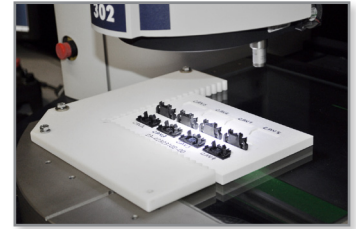
In addition to revolutionizing his injection molding business, Hlavin has found FDM to be invaluable on the manufacturing floor. "A lot of our work is in prototype development: short run, fast turn over. Stratasys FDM Technology can take a CAD file and build a part in hours. We want to provide our clients functional parts they can use for testing and validation," said Hlavin. "But what we've found after bringing in the machine is that there's a far greater purpose to FDM. And it's in our manufacturing process on our floor."

FDM touches every aspect of business at Thogus. "We have automation, robots on our machines. Rather than using a steel plate or aluminum frame for big, heavy end of arm tools that are expensive and take long time to build, we can take 3D geometry and print an end of arm tool that weighs 70 – 90% less. And we can do it in less than 24 hours."

Hlavin has found that this advantage has taken direct labor cost off of the manufacturing floor. "I don't care what industry you're in," he said. "FDM will impact it. I don't know another technology that can do what FDM can do."

But to Hlavin, benefits of FDM scale larger. "I see Stratasys FDM Technology as the future of manufacturing," he said. "We are using FDM Technology to accomplish things we never could before. "We save in excess of \$150,000 per year for factory automation, fixturing, advanced prototyping, product verification prior to tooling and more," Hlavin added. "I can't image not having this technology in a manufacturing setting. It is as critical to our business as e-mail."

When asked how FDM revolutionized his business model, Matt Hlavin answers simply: "All manufacturers are looking for ways to move products to market faster and compress their production development cycles. One resource in this world you cannot purchase is time. Now, with FDM, we're essentially able to sell time."



Quality control fixturing for molded component layouts

FDM APPLICATIONS AT THOGUS

- Rapid prototyping components and assemblies for clients
- Part consolidation – building parts that used to be assembled for clients
- Small-volume production parts
- Factory automation for custom molding facility
- Fixturing, jigs, end of arm tooling for part extraction and placement (reducing direct labor)
- Quality control fixturing for molded component layouts
- Part separation funnels for cavity separation in manufacturing
- Conveyor gates to maximize use of conveyors for multipurpose machines/parts
- Safety guarding for secondary services such as drilling, tapping, cutting, welding, etc.

For more information about Stratasys systems, materials and applications, call **888.480.3548** or visit www.stratasys.com

Stratasys Incorporated

7665 Commerce Way
Eden Prairie, MN 55344
+1 888 480 3548 (US Toll Free)
+1 952 937 3000 (Intl)
+1 952 937 0070 (Fax)
www.stratasys.com
info@stratasys.com

Stratasys GmbH

Weismüllerstrasse 27
60314 Frankfurt am Main
Germany
+49 69 420 994 30 (Tel)
+49 69 420 994 333 (Fax)
www.stratasys.com
europe@stratasys.com

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