nexa3D®

CASE STUDY

Wilson Sporting Goods Reimagines Product Development Workflows with Nexa3D x Addifab

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Customer

Wilson Sporting Goods

Industry

Sporting Goods

Application

Prototyping injection mold tooling for youth baseball bat grips

Products

- Nexa3D NXE 400 3D Printer
- Addifab De-Molding Wash Station
- Addifab Patented Blue Resin Material
- Nexa3D 2.0 3D Prep Modeling Software

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www.wilson.com/en-us

Advantages

- Larger Build Volume – With the NXE 400's large working envelope, R&D engineers are able to test multiple prototype design iterations at once, and 3D print these prototype tooling components quicker than a machine shop could turn around the same design – if they would even have been possible traditionally.
- Design & Material Freedom – Variable wall thickness, dissolvable support materials, and a larger material library are just some of the advantages with additive manufacturing tooling, compared to CNC machining.
- Elimination of Wasteful Prototype Iterations – Before discovering Nexa3D and Freeform Injection Molding, the Wilson product development engineers and technicians had to be involved with the initial first few runs for any concept they planned to test. Because their new process is almost entirely digital, they can now skip the need to have technicians constantly setting up, 3D printing, and doing post-production work on their initial design concepts.
- Simplistic Operation – R&D design engineers now have the power to take their designs directly through the 3D printer and into injection molding to test their concept themselves. In just a few days, a given concept can be drafted, 3D printed, molded and tested.
- Accurate Machines, Tight Tolerancing – "With the Nexa3D and Addifab process, not only can we create parts faster than before, but we're consistently holding +/- .001" of tolerance," Glen Mason says. "This helps our design team to move swiftly, fail fast, and quickly produce our tooling concepts to understand in a matter of days if their designs will work in production or not."
- Non-Adhesive Material Properties – Before Addifab's Freeform Injection Molding (FIM) process and their proprietary soluble print resin, there was often a high chance that a 3D print technician or molding process engineer would damage either the tool or the part during the post-production process. But now with Addifab's patent-pending dissolvable resin material, post-print operations are fairly easy to handle, requiring minimal human intervention and boasting consistent, repeatable results.

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Glen Mason
Manager of Advanced Innovation/ Industrialization, DeMarini (a division of Wilson Sporting Goods)

- Material Agnostic – This tooling design would simply not be possible without the open-source material platform offered by Nexa3D and Addifab. Wilson's engineers have ultimate design and material freedom when reimagining old products, or innovating new ones, due to the capability to injection mold with any molding feedstock, prototyping in the final manufacturing material and opening new worlds of possibility. In this case, Wilson uses a proprietary, fiber-reinforced final material.

Background

What started out as a pigskin (football) manufacturing business model has now morphed into a worldwide entity known for its quality products in a variety of different sports sectors. For over 100 years, Chicago-based Wilson Sporting Goods has been renowned globally as a leader in sporting equipment, soft goods, and other sports products. Unique to Wilson, their R&D and product development team possess the necessary software, equipment, materials, and hardware to span the entire product design lifecycle process from concept/design, to prototyping, and all the way into full-scale production.

Recently the Wilson R&D/product development team has thoroughly involved themselves in the additive manufacturing space, where they leverage a number of partners to assist with continuous product improvement and innovation. "We're just barely scratching the surface of additive manufacturing," says Glen Mason, Manager of Advanced Innovation/Industrialization at DeMarini (a division of Wilson Sporting Goods). "Not only are we looking to accelerate tooling and design iteration cycles, but we're also looking at how to get to production-ready molds with zero R&D test components needed," he explains. "Our goal with using Nexa3D's 3D printer and Addifab's FIM platform is to fail fast, and not stress ourselves out to get a design precisely right the first time."

Mason came onto DeMarini Sports/Wilson's R&D team a number of years ago, and is armed with decades of industry experience in the plastic injection molding industry. "There are so many advantages to the Nexa3D x Addifab system, my team is able to eliminate several steps when we're designing new tooling, freeing up our technical team to focus on other projects, and significantly reducing the waste and time it takes to properly test out our conceptualized designs," Mason says.

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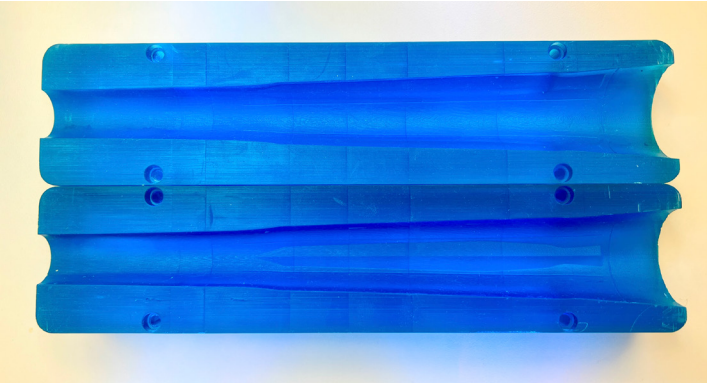

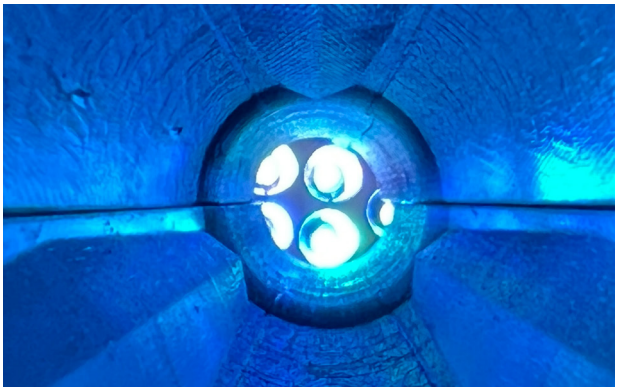

“In the last two years, OEMs like us are taking a hard look at our supply chains, as well as trying to understand how we can produce more eco-friendly and sustainable products. It boils down to producing products closer to where they’re used, and adopting design and manufacturing products that use less waste, utilize recyclable materials, and have leaner iterative design processes.”

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Challenge

The Wilson R&D team was looking for a more effective means to produce prototype injection mold tooling for a line of youth baseball bat handle. To implement these design changes within an existing baseball handle, the product development team was in search of an alternative prototyping process to significantly reduce the time it takes from “art-to-part,” and ultimately shorten the time necessary to produce these pieces on the production floor. Straying away from their traditional metal tooling methodologies, the team dove head first into redesigning this baseball component using 3D printing as the sole means towards producing this mold.

Prior to discovering Nexa3D and Addifab, the Wilson design team was using traditional subtractive manufacturing methodologies to produce their tooling for plastic injection mold prototypes. While metal tooling is typically much more rigid and robust than polymer tooling, there are several design constraints one must consider before delving too far into the concept/design phase of things.

Additionally, with a global manufacturing operation to support, Wilson was also looking for ways to shorten their product design lifecycle, and accelerate their time-to-market to find new ways to quickly churn out functional and testable prototypes.

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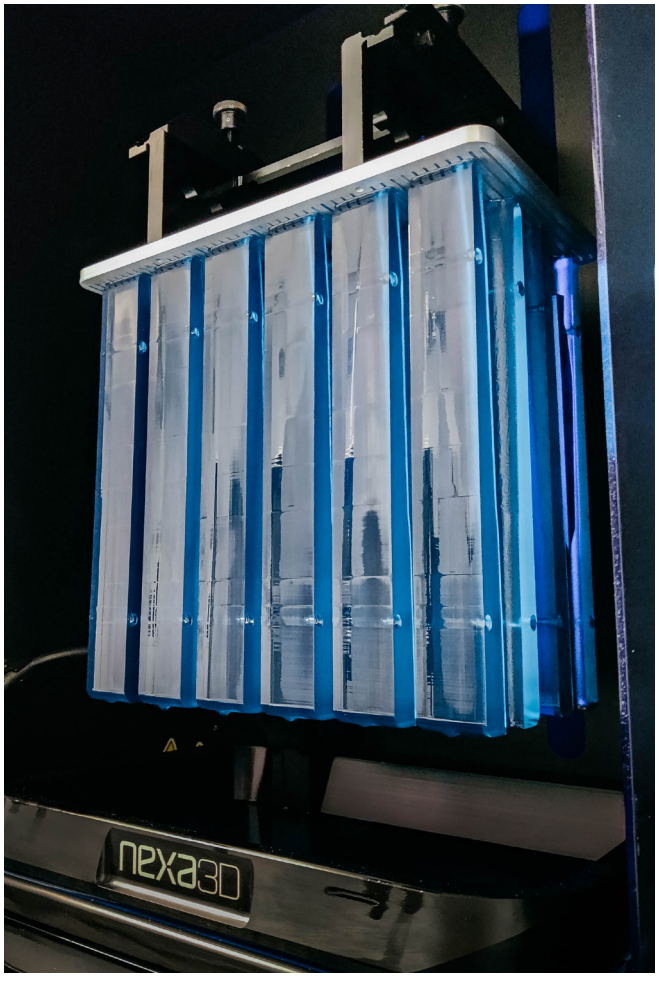
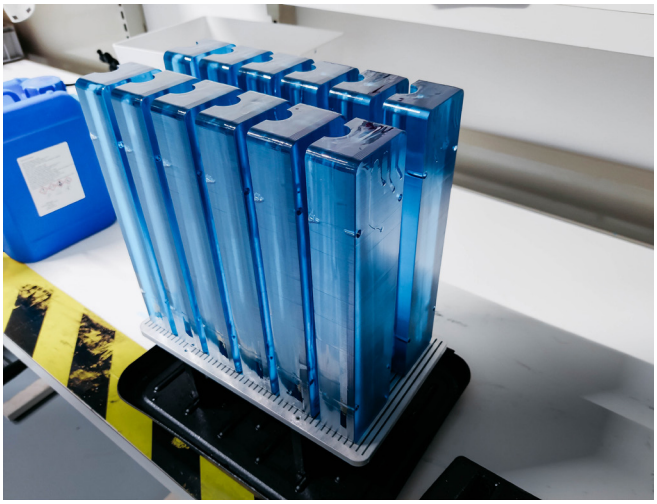
Solution

"The Nexa3D x Addifab partnership has presented several immediate advantages to my engineers," says Mason. With Nexa3D's large print envelope and ultrafast LSPc process, the Wilson R&D group can now produce multiple parts at once, in a rapid manner, allowing for multiple design iterations in a single print batch. In addition, what were previously several components assembled together can now be printed into one singular part, reducing assembly time and increasing durability for a given part.

With Addifab, the R&D designers also have much more design and material flexibility compared to using traditional metal tooling for plastic injection molding. "Our designers can afford to be off in their tolerancing for these tools now, whereas with metal tooling, even a few microns off can make or break the initial design. Additionally, with Addifab's proprietary resin material, there is no concern over adhesion or bonding of the plastic materials during the injection molding process," said Mason.

There were a number of goals in this venture, he explained, the two biggest being "how can we improve the time it takes to get new designs to market," and "what new technologies can we use to shorten the product development lifecycle, waste less material through prototype iterations, and improve the overall component design for these new projects."





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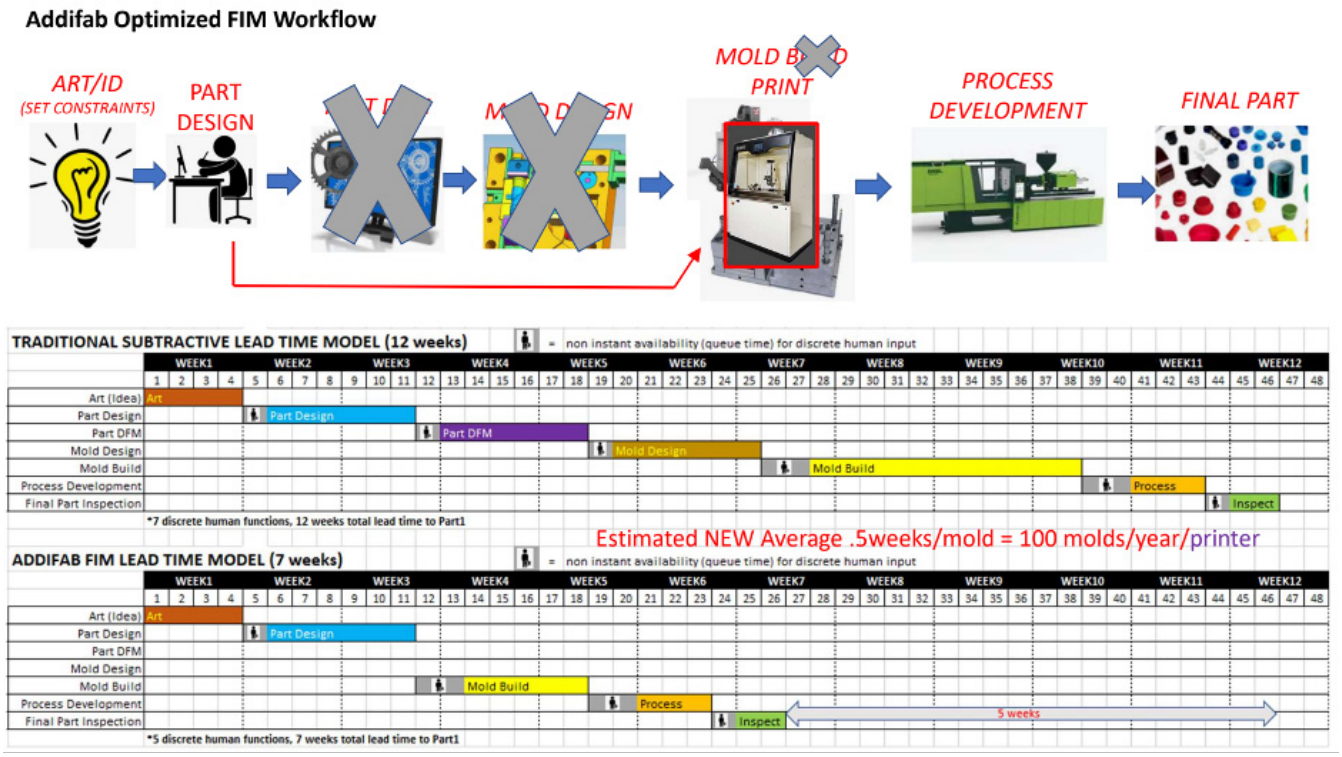

"Because we can iterate so much quicker, print tools faster than we can machine, and eliminate a couple of the steps in the process, our R&D team can afford to be wrong. This helps us to greatly improve our time-to-market, allowing us to be quick and nimble with our design decision-making process."

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After drafting an initial concept, the R&D team can typically crank out a prototype in a single working day – a process that would have taken months to create previously. There is a simple three-step process once a prototype design is decided on by the engineers at Wilson:

- **Print the Mold** – Thanks to Nexa3D's fast LSPc print process and generous build volume, Wilson R&D Engineers can typically 3D print multiple prototype tools in a single print. In a recent test run, the manufacturing team was able to print a total of 6 different molds (12 pieces) in roughly 9 hours. Previously the alternatives were either manufacturing the metal tools over several weeks / months - and that would be for just one design option then or simply not embark on the project journey at all.
- **Plastic Injection Mold the Part** – Because this new process is like molding into a thermal insulator instead of a conductor, the hot polymer material flows much easier into the mold. This reduces the risk of process errors and significantly lowers the pressure required to mold the part which translates to a lower cavity pressure and less deformation on the printed mold.
- **Post-Processing** – Using Addifab's curing system and dissolvable print resin, dunking the part into a tank and letting the liquid dissolve off the support is the only post-processing work needed to have a finished part. This alkaline-based solution removes the polymer cavity, leaving the finished component intact, ready to be tested.

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"What once took our machine shop months to build is now taking our team only days to turn around these design iterations," says Mason. "We've also eliminated two extraneous steps to our product development process, and allows for minimal interaction necessary to get to that first test run."

"Because we can iterate so much quicker, print tools faster than we can machine, and eliminate a couple of the steps in the process, our R&D team can afford to be wrong. This helps us to greatly improve our time-to-market, allowing us to be quick and nimble with our design decision-making process. We also no longer have to worry about traditional DfM constraints such as: where to place the gate, how material will flow through the part, part warpage/ deviation, or even strict tolerancing, compared to our previous tooling manufacturing."

While Wilson Sporting Goods has been a client of Addifab's for several years, the natural expansion of the relationship followed when Addifab announced its new partnership with Nexa3D, enabling significant scaling up of FIM capabilities. They were in search of a large-format 3D printer that could help the design team create multiple iterations of improved part qualities for previous product sporting goods they were looking to redesign. The molding unit used is a 418 US ton machine, requiring a scale-up capability. "Fast forward to today, we've completed about 15 different projects in a nine-month span, where before we'd only been able to crank out a few design projects in that same timespan," Mason explains.

"We've now identified clear placeholders where Nexa3D and Addifab fit into our product development process, and we are just getting started. Our long-term plans are to include this technology and new design workflow into several of Wilson's adjacent product lines such as golf, tennis, and more," he added.

The long-term play is to continue to utilize this Nexa3D x Addifab platform to continue to churn out new innovations and improvements to existing product lines. Mason explained that the team is already using this same workflow to coordinate design efforts for adjacent product lines, and will continue to do so. Although it's quite difficult to replace the durability and capabilities of metal production tooling, the Wilson product development team is constantly pushing the envelope on what's possible using additive manufacturing as their primary tool.

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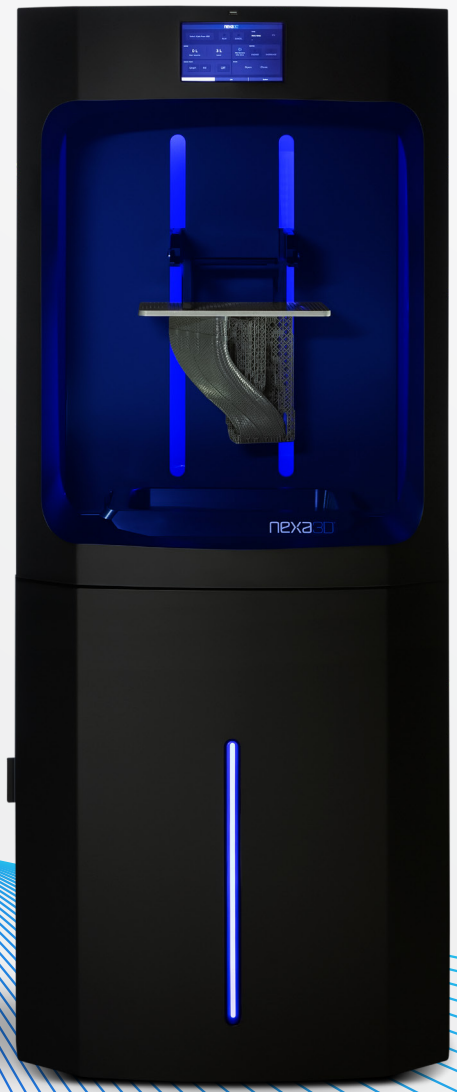

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