“We can now make nylon prototypes with nearly the exact same properties as production parts.”

Gary Hansen / RedDOT

This functional nylon impeller prototype (black) works for long test cycles.

CASE STUDY

Make It Snappy

REDDOT SPEEDS PRODUCTION WITH FDM NYLON 12 PROTOTYPES AND FIXTURES

RedDOT designs and builds mobile heating, ventilation and air conditioning (HVAC) systems and components for on-and off-highway vehicles including commercial vehicles used in construction, agriculture, military and other demanding applications.

The company’s products typically include custom injection molded parts, which often cost hundreds of thousands of dollars apiece. Functional prototyping is critical to avoid design changes that might require expensive tooling modifications or rebuilds.

RedDOT 3D prints its functional prototypes using its Fortus 3D Production System, which works with production-grade thermoplastics to build prototypes with nearly the same properties as production parts. This has long been a great fit for the majority of RedDOT parts, which are ABS plastic.

But sometimes a job requires nylon, which is flexible and tough enough for snap-fit assemblies and shock-resistant parts. For example, Red Dot builds nylon blower housings so other components can snap onto their housings. Nylon also makes fan blades that don't shatter even if debris gets sucked into the air intake.

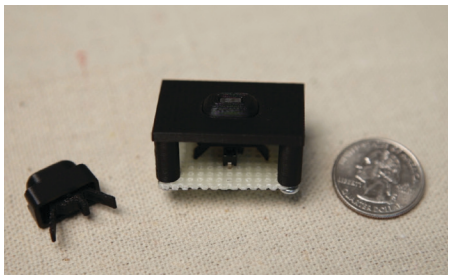
Until recently, nylon could not be easily 3D printed in-house. So RedDOT machined metal prototypes for these parts. They worked well for concept modeling but did not represent the physical properties of the nylon part for functional testing. In particular, engineers couldn't validate the snap fit or shock resistance of nylon components until committing to tooling and molding prototypes.

As a result, in many cases the first molded parts did not meet specifications and the company had to create another iteration, delaying product introduction by up to six weeks and usually requiring expensive modifications to the mold. In a few cases, the modifications were so great that a new mold had to be ordered, costing several months and six-figure retooling charges. That all changed when the Fortus gained the capability to 3D print in FDM Nylon 12.

"When we heard that Stratasys was adding nylon as an FDM material, we said we wanted to try it and they added us to the beta test program," said Gary Hansen, vice president and chief technology officer of RedDOT. "The new Nylon 12 material does exactly what Stratasys said it would do. We can now make nylon prototypes with nearly the exact same properties as production parts. We have also added the capability to make jigs and fixtures with a snap fit. For example, we have made a fixture that uses a snap fit to process hundreds of printed circuit boards every day."

"Producing rapid prototypes with Nylon 12 on our FDM system has made it possible to build functional prototypes of nylon parts that enable us to get the design right the first time," Hansen concluded. "We have eliminated delays in getting products to market and the cost of tooling modifications and new tooling involving nylon parts."

RedDOT 3D printed these durable nylon prototypes in-house with FDM.



This switch assembly takes advantage of FDM Nylon 12 snap-fit capabilities.

The 3D printed impeller prototype (black) works with its PC mate to push an ice slurry through a chilling system.

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