

PRINT YOUR OWN PARTS

Using Digital Manufacturing Technology to Bring Ideas to Life

BY ERIC ANDERSON

If you can dream it, you can build it. Well, okay...maybe you can't build it *yourself*, but thanks to the continuous development of digital manufacturing technology, if you can dream it, it can be built.

Commonly referred to as rapid prototyping or even 3D printing, advancements in the technology behind digital manufacturing are bringing the once for-prototyping-only process largely exclusive to major corporations to the mainstream. And now, thanks to companies like Redeye On Demand, an online division of Stratasys, the technology has even found its way into the hands of imaginative street machine enthusiasts.

But what exactly is digital manufacturing and how does it work? Digital manufacturing is the process of turning a digital 3D CAD file of a product into a

physical part using a machine that creates the piece one thin layer at a time. Much like an inkjet printer, which lays down ink one line at a time, digital manufacturing is accomplished by creating cross-sections of a 3D model that are then layered or "printed" on top of each other to create a physical product, hence the "3D printing" moniker.

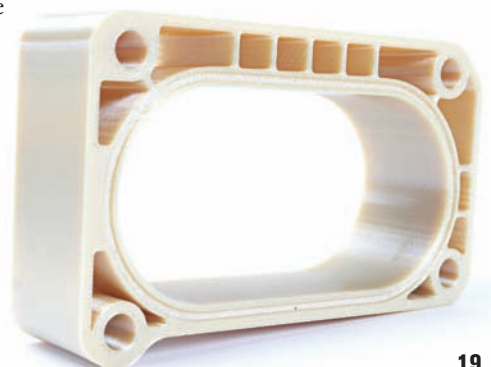
While there are numerous types of digital manufacturing technologies, fused deposition modeling (FDM) has become the most commonly used process for rapid prototyping. Redeye On Demand, a leader in 3D printing services offering production-grade plastic parts,

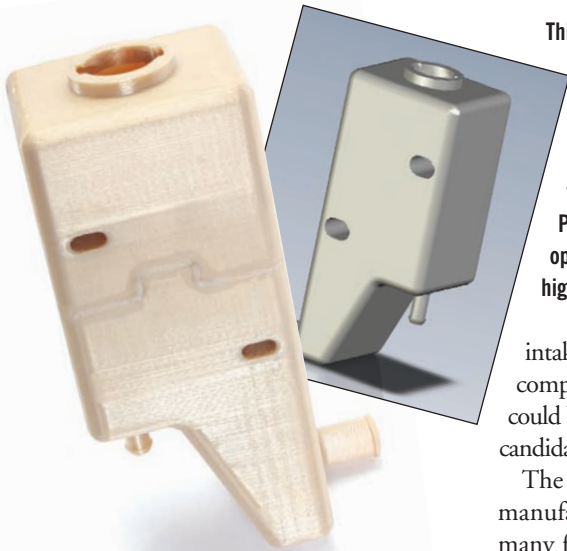
Our throttle body spacer, which features a groove for an O-ring gasket, was made using Redeye's ULTEM material, due to its strength and high heat resistance.

describes FDM as a form of additive fabrication using thermoplastics. "[FDM] melts solid plastic and extrudes it through nozzles not much thicker than a human hair (minimum extrusion of approximately 0.005-inch). Those nozzles lay fine beads of molten plastic layer by layer to quickly build parts directly from a 3D CAD model," explained Redeye's Joe Hiemenz.

Too often we've run into problems trying to find reproduction versions of worn out or unusable parts while building vintage street machines. But after learning more about digital manufacturing and Redeye On Demand, we couldn't help but think of everything from building custom end-use plastic parts to prototyping products to even recreating rare parts and pieces – it's all possible with digital manufacturing. Whether it's a rare hood ornament or a hard-to-find trim piece you need recreated, as long as you have an original to reference, a new one can be made. This definitely beats scouring junk yards and swap meets, which can be tedious and is often unsuccessful.

During the build of our project '85 Chevrolet Camaro, we've needed the help of a custom-built part numerous times. After learning more about the





This power steering reservoir was designed to mount to the side of the aftermarket radiator in our project Camaro using pass-through mounting holes and will accept the factory twist-on, spring-loaded cap. Redeye's PPSF material was the best material option for the reservoir because of its high heat and chemical resistance.

intake elbow. Because of their design complexity, none of the parts designed could be machined. But they were perfect candidates for digital manufacturing!

The ability to design with virtually no manufacturing restrictions is one of many factors that make 3D printing so appealing. "Parts produced with additive manufacturing technology are insensitive to design complexity. Adding material layer-by-layer to complete the part eliminates problems such as creating internal cavities and complicated 3D contours," explained Hiemenz.

Another factor, which is the most important for many, is cost. While digital manufacturing hasn't reached the point of being "cheap," the technology does not require costly tooling. Not only that, but machining carves parts from solid pieces of aluminum, whereas digital manufacturing builds from the bottom up and only uses the necessary amount of material. A lack of tooling and zero waste saves a considerable amount of money, and means design changes for large-scale projects cost hundreds instead of thousands.

Thanks to digital manufacturing, not only are you able to save money, but you're also able to save time...a ton of time, in fact. Depending on the size and material used, Redeye On Demand can provide completed products in less than 24 hours, and in some cases overnight. That means you can design a part today and have it ready to be shipped the next morning. Alternatively, most machine shops have lead times of at least a couple weeks if not months.

Do you need a part designed for a specific application? Or, do you have an idea for a product you want to produce and sell? If so, have the product designed and created digitally by someone like Shawn Fosness at World Speed Shop, and then send it off to the team at Redeye On Demand and have a prototype or a end-use part made. The benefits of digital manufacturing are many, and when compared to traditional machining, the sky's the limit in terms of possibilities and the time and cost savings are considerable.



The cold air intake elbow, which was made using black ABS plastic, features a four-inch inlet leading to the throttle body. The two cut-away sections highlight the build process and show how the intake was built layer by layer, regardless of the shape or angle. The final product is an end-use part that's ready to be bolted on.

build services offered by Redeye On Demand, we were eager to start designing and printing our own parts.

To help us conceptualize and design the custom parts for our project Camaro, we teamed up Shawn Fosness at World Speed Shop in Elko, MN. Fosness operates a multi-faceted shop and is skilled in product engineering and design. Using his finely honed CAD skills, Shawn designed three parts, including a power steering fluid reservoir, a throttle body spacer, and a cold air

MATERIALS

Redeye On Demand offers a number of options when it comes to materials used for digital manufacturing using FDM technology. Materials are available with a wide range of temperature resistance levels as well as both tensile and impact strength ratings, and some materials are even available in multiple colors.

Available thermoplastic materials include: ABS, ABSi (semi-translucent), ABS-M30 (25-70-percent stronger than ABS), Polycarbonate/PC (high tensile strength), PC-ABS (highest impact resistance), ULTEM (flame, smoke, toxicity certified and high heat resistance), PPSF (highest heat and chemical resistance).

No matter what type of product you've got in mind, as long as it can function made of plastic, Redeye On Demand has a material that's right for you. To learn more about the different thermoplastic options, visit their website at redeyeondemand.com/OurMaterials.aspx.



SOURCES

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