



Driving Innovation

LAMBORGHINI SPEEDS PRODUCTION WORKFLOW WITH 3D PRINTED PRODUCTION PARTS

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– Fabio Serrazanetti, Lamborghini

CASE STUDY



Lamborghini's 50-year heritage has seen the brand become synonymous with extreme and uncompromising automotive design.

Automobili Lamborghini S.p.a., Sant'Agata Bolognese, Italy, can lay claim to being a manufacturing epicenter for some of the world's most sought-after super sports cars. Lamborghini prides itself on a 50-year heritage that has seen its brand become synonymous with extreme and uncompromising automotive design. The company has created a series of extraordinary cars that include the 350 GT, Miura, Espada, Countach, Diablo, Murciélago, Gallardo and Aventador, as well as several limited series such as the Reventón, Sesto Elemento, Aventador J and Veneno.

Track-Ready Motor Racing Parts

Lamborghini meets this objective partly through 3D printing, which the company uses throughout the entire lifecycle of its parts, from rapid prototyping applications to production parts. Today Lamborghini is owned by Audi, part of the Volkswagen Group. With its image and value proposition as important as ever, the company relies upon pioneering technologies to uphold its reputation for automotive excellence.

Fabio Serrazanetti of Lamborghini's car body technical department says the company's engineers first explored FDM® technology and Fortus® 3D Production Systems in order to meet demand for high-strength production parts tough enough to endure the rigors of high-speed racing, as well as the need to create complex geometries in a very tight timeframe.

"We use Stratasys® technology to produce FDM-printed production parts because, quite simply, it meets all the requirements demanded of it," he explains.

Serrazanetti adds that the 3D printer fulfills the need to create high-performance aesthetic parts like profiles and air conduits. "In the motor racing world, the capability to very quickly output highly durable parts and components within a seemingly unlimited design scope offers an unprecedented advantage."

Beyond the racetrack, 3D printing has also accelerated Lamborghini's rapid prototyping applications by slashing costs and enhancing workflow efficiencies. Having previously outsourced its prototyping requirements, operations were brought in-house in 2007 with the installation of a Dimension 1200es™ 3D Printer. This was followed by a Fortus 360mc™ Production System in 2010 and a Fortus 400mc™ in 2013.

As Serrazanetti explains, the in-house FDM printing systems quickly delivered a raft of important and tangible benefits: "Outsourcing our rapid prototyping operations proved both a lengthy and costly exercise," he says. "Today we have overall greater control of projects and have optimized lead times and reduced costs in the process."

Wide-Ranging Material Usage

Serrazanetti and his team use 3D printing predominantly to produce scale models and advanced functional prototype parts for design verification and fit and form suitability. These include an array of different exterior parts – from section bumpers, grills, aesthetic frames and those in the engine bay – to various interior parts that span door panels, seat covers and steering wheels, along with aerodynamic components such as conveyors and air heaters. FDM eliminates tooling, which keeps costs down and allows rapid iteration on new designs without manufacturing constraints.

Within these applications, the choice of materials varies according to high temperature requirements and the level of stress subjected upon the model during assembly, dimensional and mechanical testing.

"We aim to use materials that mimic the material properties of the final product," explains Serrazanetti. For example, Lamborghini uses ULTEM 9085 resin for the grill, since that part will be subjected to high temperatures from the engine compartment. Serrazanetti says the ULTEM material helps field urgent requests from Lamborghini's Advanced Composite Research Center: "It allows us to quickly and confidently produce extremely strong complex parts when the timeframe leaves the technicians with no other option."



The Fortus 400mc 3D Production System produces parts that include Nolders, an aerodynamic profile installed under vehicle bumper.



This 3D printed air aspiration engine conduit was produced in ULTEM 9085 resin on a Fortus 400mc 3D Production System.



An elbow support door panel, 3D printed on a Fortus 400mc 3D Production System in tough ULTEM 9085 resin.

He adds that the company also uses PC-ABS since it's perfectly suited to producing certain interior parts due to the material's excellent feature definition and surface finish.

Serrazanetti and his team typically test functional prototype parts on static scale model cars, as well as mount 3D-printed parts onto working prototype versions of the company's next launches. These cars then undergo more intensive track or road testing to gauge a more realistic performance evaluation of specific parts during the development phase.

Winning Partnership for the Road Ahead

With the ability to dramatically improve cost and production efficiencies within Lamborghini's rapid prototyping operations, Serrazanetti says that 3D printing makes his and his team's life easier.

"At the moment Stratasys' technology delivers the fastest and most economical means of constructing prototype parts for us," he concludes.



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