Stratasys becomes NASCAR Competition Partner

Stratasys Direct leverages H350™ to 3D print high-performance production SAF™ components for the entire fleet of NASCAR Next Gen Cars

The National Association for Stock Car Auto Racing (NASCAR) is an American auto racing association best known for stock car racing. This high-speed high stakes sport enjoys a huge following in the United States and around the world. Stratasys application engineers, using SAF™ technology on the H350™ printer recently came up with a solution to a major challenge facing NASCAR's Next Gen car.

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> “The Next Gen car could not have been completed without the collaboration with NASCAR Competition Partners like Stratasys and Stratasys Direct Manufacturing.”
>
> **John Probst**
> Senior Vice President, racing innovation, NASCAR

Case Study

NASCAR presents Stratasys with a Challenge

While testing the new design and prototype of its Next Gen car, NASCAR drivers reported extreme heat temperatures within the cockpit of the vehicles, making it extremely uncomfortable for drivers. While racing, drivers are fully kitted out in flame retardant suits and helmets, so additional heat from the engine or high ambient temperature further adds to their discomfort.

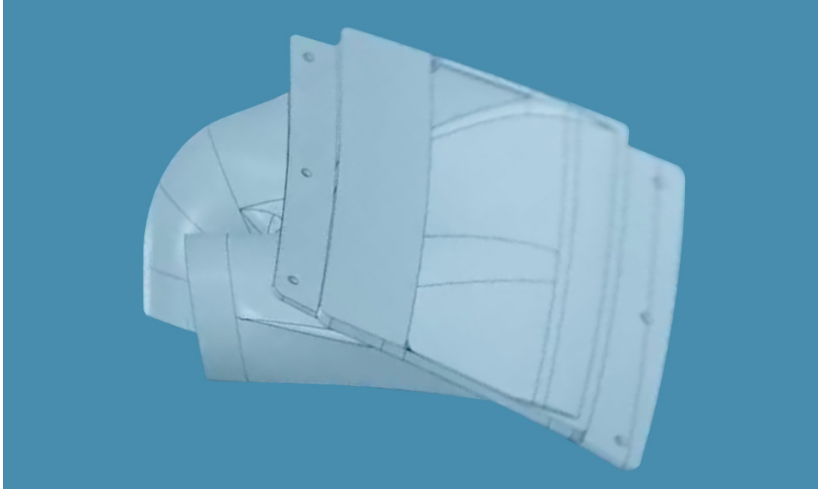
The challenge was to create a solution that would cool the interior of the car and meet temperature and durability requirements at a competitive cost-per-part for volumes up to thousands of parts. The solution required that no modifications be made to the design of the Next Gen car, which had already undergone nearly three years of planning, design, development, and 37,000 miles (59,500 kilometers) of testing.

With racing season mere months away, NASCAR needed a solution that would enable them to get custom high-performance production parts in weeks – in time for the racing season. For that reason, NASCAR engineers turned to additive manufacturing.

To enhance airflow within the cars' interior, NASCAR's Senior Design Engineer Tim Murphy designed an air ventilation duct that could be mounted directly on the cars' windshields, eliminating drag that could impair car speed. Murphy designed the airflow component to mount on the car's windshield in line with the inlet, which would bring air in and redirect it to the drivers' chests and legs to keep them cool.

Already familiar with Stratasys and its expertise in 3D printing, Murphy reached out to Stratasys Direct Manufacturing to find the right additive technology and material that would meet robust performance and safety standards.

Stratasys Direct needed to find a solution that would withstand high temperatures and tough racing conditions, wind speeds of up to 200 miles per hour (321 km per hour), and fuel fumes.



The part is finished on the Dymansion S

NASCAR Competition Next Gen cars with Air Vents

Stratasys and NASCAR devise a solution

Stratasys Direct Manufacturing Engineers tested various options and recommended NASCAR use SAF™ technology powered by the Stratasys H350™ 3D printer

SAF is built around production, which allows parts to move quickly from a CAD to a high-performance production part in the quickest and most cost-effective manner. Stratays' H350 printer uses High Yield PA11, derived from sustainable castor oil which delivers all the characteristics that NASCAR required for the part. PA11 parts demonstrate high-impact resistance and durability and allow for maximum build density while part consistency is preserved. PA11 delivers production-grade polymer parts for large volume demands and enables a high nesting density lowering costs and time to completion.

Accuracy, repeatability, and high-quality parts

As a mandatory part of every Next Gen car, the air ventilation unit needed to be accurate and repeatable, featuring the same weight, look, and dimensions for every car throughout the fleet. The H350's SAF technology ensures high levels of accuracy, repeatability, and finishes. The 3D printer's counter-rotating roller coats powder layers onto the print bed and uses High Absorption Fluid (HAF™) to image the part layers. A passing IR lamp fuses the imaged layers over the entire span of the print bed, providing uniform thermal conditions to ensure part consistency. After the build, the parts are cleaned, finished, dyed black, and non-abrasively shot-peened with a polymer bead blast using DyeMansion's S system to give them a homogeneous semi-gloss surface treatment.

> "We've helped Nascar move from 3D printed prototypes to end-use production parts on its high-performance race cars."
>
> **Pat Carey**
> Senior Vice president, Strategic Growth for Stratasys

Tim Murphy, part designer, installs air flow duct onto Next Gen car windshield.

Brandon Thomas, NASCAR Next Gen car designer, holding the 3D printed windshield air cockpit ventilation unit.

High impact spin-offs for Stratasys and NASCAR

Stratasys Direct began fabrication of the 3D printed parts in early January 2022 and shipped the first set of 60 air ducts later that month – just in time for the 2022 NASCAR Cup racing season. The parts were printed on the H350, then finished with media that is blasted to clean the parts with the DyeMansion Powershot C, then dyed black on DyeMansion's DM60, then shot peened with the Powershot S. Over the next six months, Stratasys Direct printed and shipped 650 ventilation components for use on the Next Gen cars.

NASCAR reports that the ventilation units have reduced temperatures, enhanced performance, without impacting aerodynamics on the Next Gen cars. The air flow ventilation units are now being used by every team that competes in the NASCAR Cup Series.

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