High Performance Production Through 3D-Printing Pilot

Demonstrating 'Hybrid' Automotive Suspension Components

VANGUARD INITIATIVE

Challenges

- Increasing the performance and safety of track cars
- Reducing weight of suspension components

Project duration: 9 months
Industrial sectors: Automotive
Consortium coverage: The Netherlands, Italy

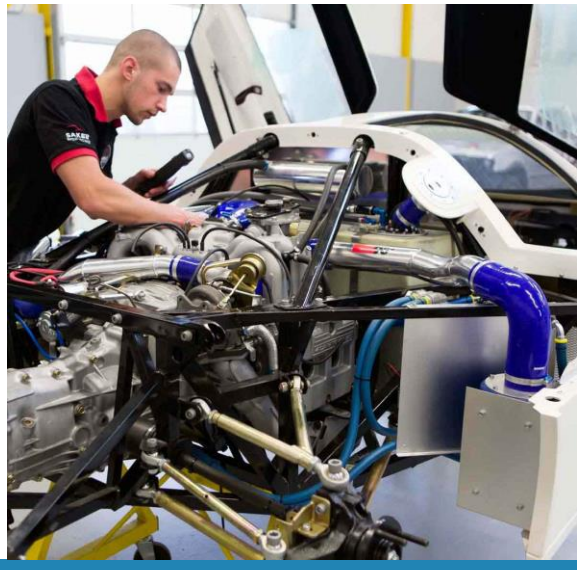
Saker Sportscars B.V. is a Dutch manufacturer of pure sports cars purpose built for the track. Saker's vehicles distinguish themselves by having a timeless design combined with modern technologies, and a low weight approach combined with an extremely reliable powertrain has made these cars winners in various different racing series, including the DNRT, ACNN, Belcar, Supercar Challenge as well as in the UK Britcar series. In order to remain competitive on-track, Saker is constantly searching for new innovations which can be integrated to enhance the performance of the cars.

The Challenge

As a manufacturer of sports cars, Saker is constantly on the forefront of development to improve the overall performance of its vehicles. One of the critical substructures of a vehicle, which contributes directly to the overall performance as well as its safety, is the suspension structure. The adoption of additive manufacturing technologies in the production of suspension components would allow for a reduction in weight of the suspension structure, thus directly impacting the performance as reduced weight will allow the driver to brake later when approaching corners and consequently use less energy when needing to accelerate out of those corners. This weight reduction also effects the un-sprung weight of the car, which in-turn creates a more stable platform. This improved stability and predictability of the platform increases the overall safety for the drivers.

The Project

Within the project, Saker had the objective to adapt the suspension knuckle and framework of the cars in order to achieve lighter weight and safer configuration. A reduction in the weight of the knuckle of 50% would directly contribute to a 35-40% overall weight saving of the entire suspension framework . Specifically, the objective of the project was to demonstrate the potential of 3D printed metal inserts, combined in Thermoplastic Composites through a production process called Compression Moulding. Through the project, Saker wanted to understand and validate the design, manufacturing processes and connections of hybrid suspension parts.



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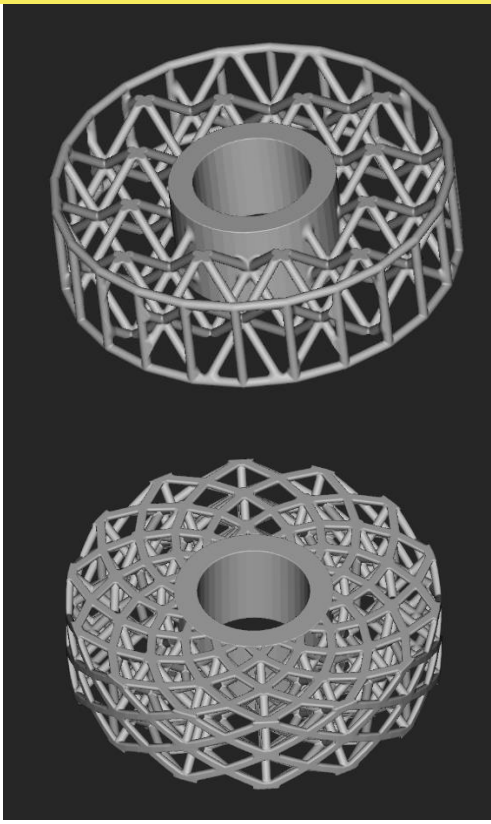
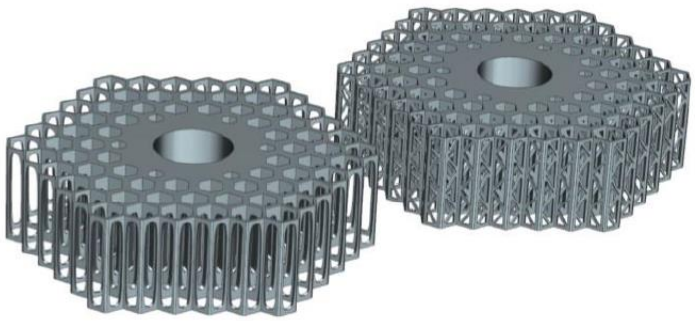


Role of the Facility Centres

For the implementation of the project, Saker turned to the University of Bologna based in Italy, and the HAN University of Applied Sciences based in the Netherlands. The 3D printed metal inserts were designed by the University of Bologna, which has unique experience in the field of designing and combining 3D printed metal parts with Thermoplastic Composite materials. These Composites have a much higher viscosity and therefore different flow characteristics of other printed materials, thus requiring specialised expertise. The HAN University of Applied Sciences was involved in the design of the test sample mould as well as the printing of the individual test samples. This was done within their Smart Production Centre, a Smart Industry Fieldlab specialised in Advanced Automotive Applications. Once printed, the samples were shipped to the University of Bologna to conduct mechanical testing in their tensile testbench to collect structural integrity data of the specimens. For comparative reasons, some of the samples which had been produced were put through simulations and testing at the site of the HAN University of Applied Sciences Smart Production Centre. Through this testing, more insights related to the characteristics of the structure was gained, the outcome of which will be used to design the new insert for the knuckle, thus bringing the overall knuckle to the next TRL level.

Results achieved

Through the implementation of this project, extensive knowledge was gained relating to the development of hybrid material suspension components for automotive application. This 3DP PAN EU supported project represents a first exploration towards hybrid connections between 3D printed metals and Thermoplastic materials for the automotive sector. Saker Sportscars will continue their work within this area through the continuation of the project, made possible by regional funding. Within this continuation, the focus will be placed on further mechanical testing of samples as well as conducting fractography analysis. Furthermore, an investigation will be conducted relating to the effects of bio-materials, fibres and resins on insert and flow behaviour in order to also reduce the environmental impact of the production process.



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