



E-Racing Team turns to EnvisionTEC to ensure performance

StarkStrom Augsburg eV is a non-profit association for the promotion of student research around the subject of electromobility. The association was established in 2011 and each year assembles a team of up to 100 students from all faculties of Augsburg University of Applied Sciences to build electric racing cars that compete in Formula Student Germany, an international design competition (<https://www.formulastudent.de>).

The aim is to expose students to complex projects and give them the opportunity to distinguish themselves in the areas of design and production, together with gaining practical experience to aid their studies and future careers. The team even competes in the driverless car series.

In 2017 the team approached EnvisionTEC's distributor Dreigeist about the potential for team sponsorship. As automotive is an area of speciality for EnvisionTEC it both supported the team as a Silver sponsor and helped in the production of critical parts for the car.

"Huge thanks to the EnvisionTEC team for their support. Their engineering experience coupled with the 3D printers and automotive focused materials were essential to the performance of the car"

- Lukas Dehlinger, Mentor Drivetrain, StarkStrom Augsburg eV



The water jackets produced by EnvisionTEC ensure that the motor stays cool and operating optimally.



StarkStrom Augsburg eV

Industry:
Automotive

Machines:
Perfactory 4 XL

Material:
HTM 140 V2

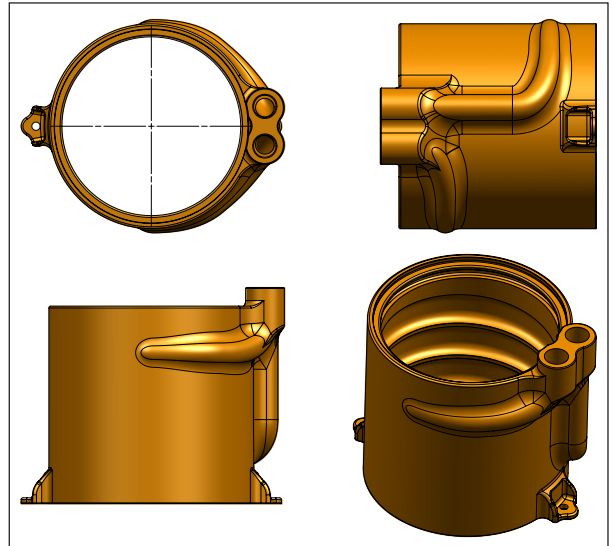
The Solution

The car produced by StarkStrom Augsburg eV has 4 wheel drive with motors on each wheel. These motors are 12.3kw each and produce 80PS and 287Nm per wheel. This allows the cars to accelerate From 0-100 km/h in 2.7 seconds. The problem the team was encountering was the cooling of these motors for the duration of races. Overheating of the components risked reduced performance or even component failure.

The team needed sealed water jackets that would allow for high pressure coolant to be circulated around the motors to carry away the excess heat. These would need to be efficient, ensuring the maximum flow of water and robust to withstand the rigours of motor racing.

The solution came in the form of a series of 3D printed parts from EnvisionTEC. The business both supplied engineering support and offered to produce the components they needed. These components were printed on an EnvisionTEC Perfactory 4 Standard XL at a resolution of 50µm. Each Piece taking 17 hours.

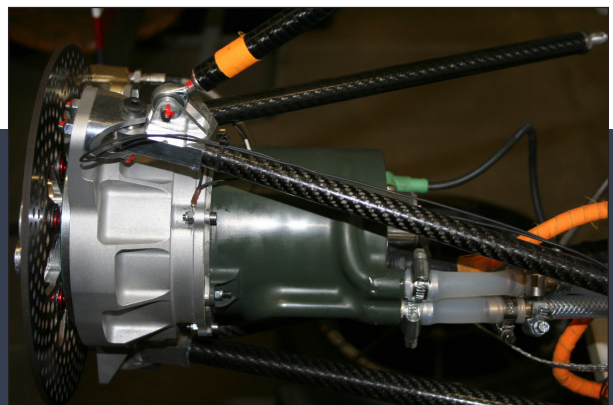
Surface finish of the components was an essential consideration, with any imperfections resulting in reduced water flow and efficiency. The EnvisionTEC professional grade 3D printer's 50µm resolution and HTM 140 V2 material allowed for extremely accurate reproduction of the CAD designs, and importantly an extremely smooth surface on the inside of the jacket maximising the flow of coolant to and from the motors.



The water jacket was CAD designed to accommodate both the hub, and motor design. It has to also ensure the maximum coolant flow to and from the part.



Parts printed and ready for fitting.



The final part as fitted to the car hub.

“The parts produced were both strong enough for racing and hardy enough to withstand the high motor and water temperatures. The jackets allowed for the efficient cooling of motors that in turn allowed us to run harder. The cooling also helped to preserve the motors.”

- Lukas Dehlinger

Formula Student Germany challenges students to build a single seat formula race car with which they compete against teams from across the world. The competition is not won solely by the team with the fastest car, but rather by the team with the best overall package of construction, performance, financials and sales planning.



EnvisionTEC Materials, the perfect choice for automotive

Automotive companies are using EnvisionTEC printers and materials for prototypes, design verification, auto show parts, jigs, fixtures, fasteners, molds and more:

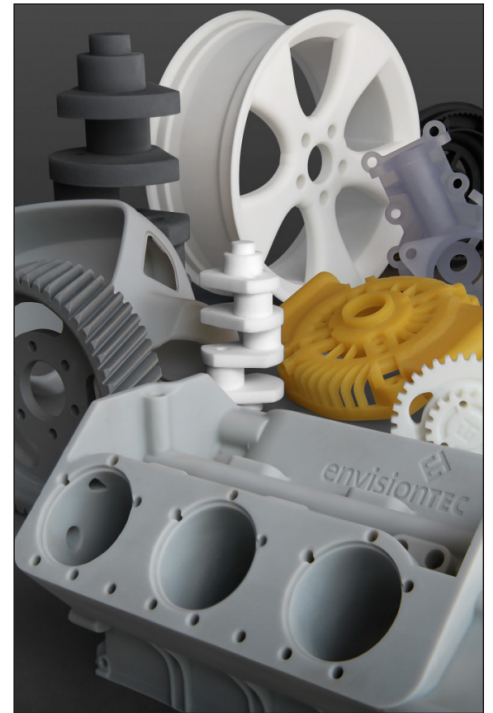
- **ABS Flex White 3SP** - ABS Flex White is an ideal solution for a wide variety of applications including snap-fit items and assembly applications which require some elasticity.
- **E-Shore A** - An advanced engineering-grade polyurethane-like material that produces a final material with soft Shore A values of 40 or 80 depending on your needs.
- **FormCast** - An advanced, engineering-grade material delivering large castable patterns and functional prototypes.
- **E-CE** - A stiff, heat-resistant, high-performance dual-cure material that also offers chemical resistance. Perfect for industrial products that require thermal stability such as under-the-hood parts.
- **E-Poxy** - A partially biosourced, tough, dual-cure material that delivers strong, thin-walled final products. E-Poxy offers a good relationship between flexibility, hardness and heat resistance that is also ideal for connectors, among other objects.
- **E-Rigid PU** - A polyurethane-like resin that 3D prints end-use and prototype parts that compete with injection molded plastics.
- **ABS Hi-Impact 3SP** - ABS Hi-Impact 3SP is a tough material, suitable for high quality prototypes as well as stable enough for production-quality end use parts.
- **E-Model** - A tough material, suitable for high quality prototypes as well as the production of production-quality end use parts.

Partners

EnvisionTEC undertook the production and finishing of the parts for the car, additional thanks go to German Distributor Dreigeist for its support.

About EnvisionTEC

EnvisionTEC is a leading global provider of professional-grade 3D printing solutions. Founded in 2002 with its pioneering commercial DLP printing technology, EnvisionTEC now sells a variety of printer configurations based on six distinct technologies that build objects from digital design files. The company's premium 3D printers serve a variety of medical, professional and industrial markets, and are valued for precision, surface quality, functionality and speed.



- **LS600** - An extremely durable photopolymer for use in producing very accurate parts with high feature detail. LS600 produces parts with high impact resistance similar to thermoplastics.
- **E-Glass 2.0** - A transparent material for use on EnvisionTEC's 3D Printers. Featuring excellent surface finish quality and feature resolution, E-Glass 2.0 is an ideal 3D printing solution for simulating clear plastics.
- **E-RigidForm** - A polyurethane-like resin that 3D prints strong, hard and stiff parts that can be used for prototypes and end use.
- **HTM 140 v2** - A high temperature molding material for non-metal masters dramatically changes 3D printing capabilities for manufacturers. HTM140 can be directly vulcanized in rubber, eliminating the need for a metal master.

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