High-Speed Designs

KU E-RACING MEETS RACING CHALLENGES WITH 3D PRINTED PRODUCTION PARTS

“With 3D printing we could design parts that adapted to our specific needs rather than designing the car around the parts.”

– Aldus von der Burg, KU e-Racing

CASE STUDY

KU e-Racing’s second-generation race car features production parts off a 3D printer for reduced weight and improved speed. Here the team poses with the car at the Silverstone race.

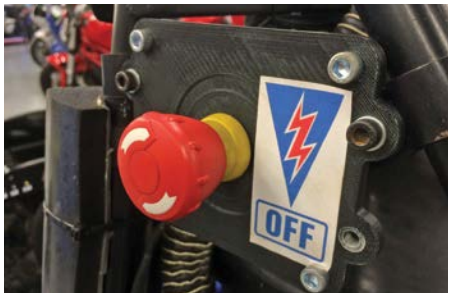
Specializing in the production of electric race cars, Kingston University’s electric car racing team (KU e-Racing) has quickly established itself as a leader in the field. In 2013 and 2014, it was named the United Kingdom’s highest scoring Formula Student electric team in the annual Formula Student race at Silverstone.

Established in 2012, the south London-based company has produced two electric cars. The first featured a number of metal parts and an air-intake requiring a constant running pump that needed replacing frequently due to overheating. The second featured a number of parts produced using 3D printing in a bid to reduce the overall weight and improve the speed of the car.

Minimizing Weight and Slashing Production Time

“Additive manufacturing was an obvious means of reducing the weight of the car,” explains Aldus von der Burg, team leader at KU e-Racing. “By replacing metal parts with extremely tough, yet very lightweight 3D printed plastic components, we were able to decrease the overall weight of the car. With the precision of 3D printing, we could design, 3D print and test parts that directly fit the car and can endure the strain of motor-racing.”

According to von der Burg, 3D printing enabled the company to avoid costly manufacturing inaccuracies since its partnered reseller could iterate several models of a part simultaneously. It also gave them the ability to directly manufacture a number of production parts simultaneously – eliminating the labor time required and slashing production time by around 40 percent compared to traditional manufacturing.



3D printed in ABSplus, the shutdown mount can withstand the sudden shock during an emergency.

Creative Possibilities that Surpass Traditional Manufacturing

With its Stratasys® 3D Printer, KU e-Racing creates prototypes that perform like the final product. For instance, the company 3D printed a shutdown button mounting and main switch housing in ABS*plus*™ production-grade thermoplastic.

“Using additive manufacturing, we were able to overcome our main developmental concern to manufacture parts that could withstand the gruelling pace and heat of motor-racing,” says von der Burg. “With the toughness of our 3D printed parts, the results did not disappoint, particularly the shutdown button mounting which needed to withstand sudden shock when slamming the button hard during an emergency.”

KU e-Racing 3D printed this exhaust fan housing in high-performance ULTEM 9085 resin.

During the design process, KU e-Racing could also produce more complex parts than traditional manufacturing allowed, whether in-house or with a Stratasys reseller or service bureau. An exhaust fan housing was 3D printed in high-performance ULTEM® 9085 resin, ideal for automotive applications with its FST (flame, smoke and toxicity) rating and high strength-to-weight ratio. An air intake system was also 3D printed in PC-ABS on a Fortus 400mc™ 3D Production System by its reseller, Laser Lines.

“FDM 3D printing technology enables us to realize creative design freedoms without the limitations and constraints imposed by traditional manufacturing,” says von der Burg. “With 3D printing we could design parts that adapted to our specific needs rather than designing the car around the parts.”

In an effort to overcome airflow restrictions caused by its first-generation air intake, KU e-Racing redesigned and 3D printed an automated radiator fan featuring an open front. This avoided a restriction in the incoming airflow at high speeds and directly improved the overall airflow of the system. The high heat resistance of the PC-ABS material ensured that the air intake was robust enough to endure the rising temperature and constant speed vibration of motor-racing.

stratasys

E info@stratasys.com / STRATASYS.COM

HEADQUARTERS
7665 Commerce Way, Eden Prairie, MN 55344
+1 888 480 3548 (US Toll Free)
+1 952 937 3000 (Intl)
+1 952 937 0070 (Fax)

2 Holtzman St., Science Park, PO Box 2496
Rehovot 76124, Israel
+972 74 745-4000
+972 74 745-5000 (Fax)

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