

Press release

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3D-printed steering shaft for new student racecar reduces weight by as much as 50%

- **Once again, the Formula Student team from TU Darmstadt is driving with special aluminum components made using additive manufacturing at Heraeus**

The new TU Darmstadt racecar for the current Formula Student competition contains no fewer than five ultralight 3D-printed components from Heraeus. A steering shaft made from a special aluminum alloy (AlSi10Mg) is nearly 50% lighter than the model that preceded it. The new steering shaft, designed and printed by Heraeus precisely to the specifications of the TU Darmstadt racing team, now weighs barely 300 grams while maintaining the same mechanical strength and stability. "We completely redesigned the part and repeatedly optimized it through simulations to achieve the maximum weight reduction. The combination of materials and construction expertise with printing know-how was crucial for reaching this ambitious goal," says Tobias Caspari, head of Heraeus Additive Manufacturing. For the new TU Darmstadt racecar, the Heraeus team also printed a total of four motor shafts for each wheel suspension, which are likewise 50% lighter than their predecessors. "The Formula Student is a good testing ground for our young development team, where they can test and optimize new designs and materials for additive manufacturing," Caspari says.

Users increasingly opt for the design freedom of 3D printing

More and more users are intentionally taking advantage of the design freedom that additive manufacturing offers, rather than simply recreating a previously used form. "Additive manufacturing, which involves building up layer upon layer of metal powders, makes it possible to construct much lighter but still stable functional components with entirely new design possibilities. At the same time, we conserve resources and can recycle any excess powder," says Tobias Caspari, describing the advantages of this innovative manufacturing technology.

Heraeus has been developing special metals and the corresponding 3D printing processes since 2013. The challenges started with manufacturing the powder. Materials and process expertise are crucial, as the metal powders and printing process must be perfectly aligned. At the Hanau 3D Center, users have access to experts in design and process simulation, several production facilities, and recycling options for used metal powder. Business in the area of additive manufacturing is gaining momentum, and printable metal powder alloys are continuously being added to the product portfolio. These include intermetallic alloys, bioresorbable materials, and gradient materials, as well as amorphous metals, a metallic glass with special mechanical properties.

About Formula Student

This race series is an international construction competition for engineers, in which student teams from around the world compete with racecars they have designed and built themselves. First launched as Formula SAE in 1981 in the USA, the race series was brought to Europe as Formula Student in 1998. The Technical University (TU) Darmstadt formed a club specifically for the purpose of participating in Formula Student: the TU Darmstadt Racing Team e.V. (DART). It is both a registered nonprofit organization and a student group at the TU Darmstadt.

Heraeus, the technology group headquartered in Hanau, Germany, was founded in 1851 and today is a globally leading, family-owned company. With technical expertise, a focus on innovation, operational excellence and entrepreneurial leadership, we constantly strive to improve our business performance. We create high-quality solutions for our clients and strengthen their competitiveness in the long term by combining material expertise with technological know-how. Our ideas are focused on themes such as the environment, energy, health, mobility, and industrial applications. Our portfolio includes everything from components to coordinated material systems, and our products are used in a wide variety of industries, including the steel, electronics, chemical, automotive, and telecommunications industries. In the 2016 fiscal year, Heraeus earned revenues—excluding precious metals—of €2.0 billion and total revenues of €21.6 billion. With around 12,400 employees worldwide in more than 100 subsidiaries in 38 countries, Heraeus holds a leading position in its global markets.

In 2016, Heraeus was named one of the Top 10 Family Businesses in Germany by the Foundation for Family Businesses.

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