

Efficient Lightweight Motors for Electric Vehicles

In Cooperation with Four Companies, KIT Develops Flexible Technologies for the Series Production of Lightweight Electric Motors under the “ProLeMo” Project

Large-scale implementation of electric mobility requires low-cost and flexible production of efficient electric drives. New lightweight construction concepts may reduce vehicle weight and, hence, energy consumption during acceleration. While lightweight construction of the car body has meanwhile become state of the art, future work will focus on reducing the weight of electric motors. Development of technologies for series production is the objective of the “ProLeMo” project, in which Karlsruhe Institute of Technology (KIT) is one of the partners.

Stationary electric motors currently reach a high efficiency of up to 95%. Flexible series production of parts and models of electric motors, however, still is a big challenge in production technology. In addition, the ratio between motor power and motor weight – the power to weight ratio – is to be increased in order to reduce the weight of the complete vehicle. “For this purpose, new materials have to be integrated in the motors. Moreover, production of motor components has to be simplified,” Manuel Peter from KIT’s Institute of Production Science (wbk) explains. To master these challenges, the ProLeMo project partners from industry and science pursue a holistic and integrated interdisciplinary approach.

Under ProLeMo, the Institute of Production Science studies solutions for the use of fiber-reinforced plastics in the electric motor. Within the next three years, the scientists will establish the process chain needed for the production of a demonstrator. It is planned to produce the rotor, stator, and housing with integrating cooling. The Institute of Vehicle System Technology (FAST) will develop components made of fiber composites. Use of modern simulation tools will guarantee that these components will meet the operation requirements.

The project partners possess the expertise required for the project. The project is coordinated by WITTENSTEIN cyber motor GmbH, a



*KIT Mobility Systems Center:
Solutions for tomorrow’s mobility*

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company specialized in the development and manufacture of permanently excited high-performance synchronous motors. In the area of injection molding technology, ARBURG GmbH + Co KG will work on alternative materials for motor components to be produced by injection molding. Cutting and fiber deposition work will be performed using the lasers and milling machines of the INDEX-Werke GmbH & Co. KG Hahn & Tessky. Aumann GmbH is responsible for the development of the process and machines to manufacture the coils required. On the part of research, the Institute of Production Science (wbk) and the Institute of Vehicle System Technology (FAST) of Karlsruhe Institute of Technology (KIT) support the project that has a duration of three years.

The research project in the total amount of EUR 3.3 million is financed by the Federal Ministry of Economics (BMWi) providing EUR 1.7 million. The project is managed by the German Aerospace Center (DLR).

More information can be found at www.prolemo.de.

The Mobility Systems Center pools KIT activities relating to vehicle technology. Presently, 40 KIT institutes with about 800 employees are working on methodological and technical fundamentals for tomorrow's vehicles. It is their objective to develop concepts, technologies, methods, and processes for future mobility considering the complex interactions of vehicle, driver, traffic, and society.

Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. Research activities focus on energy, the natural and built environment as well as on society and technology and cover the whole range extending from fundamental aspects to application. With about 9000 employees, including nearly 6000 staff members in the science and education sector, and 24000 students, KIT is one of the biggest research and education institutions in Europe. Work of KIT is based on the knowledge triangle of research, teaching, and innovation.

This press release is available on the internet at www.kit.edu.