



Smart Headlamp Technology: Research project for the efficient development of an intelligent headlamp

- **New monitoring and control processes to ensure optimum performance of high-resolution headlamps**
- **Complex series development process is researched to reduce development times and costs**

Lippstadt, October 8, 2018. Modern headlamp systems enable variable light distributions that generate the optimum lighting for every traffic situation - from city light to glare-free high beam. They are complex technical systems in which a large number of LEDs are precisely matched to one another. The expected service life of the individual LEDs exceeds the service life of the vehicle by far. However, as with all lighting systems, long-term changes in performance cannot be ruled out. The "Smart Headlamp Technology" research project therefore aims to develop an intelligent headlamp that not only detects potential changes in performance at an early stage (condition monitoring), but is also capable of compensating for them (self-healing). In addition to the lighting and electronics specialist HELLA, the Fraunhofer Institute for Mechatronic Systems Design IEM and the universities of Paderborn and Dortmund are involved in the research project. The project started in April 2017 and is supported by the European Regional Development Fund (ERDF) for a period of three years.

In the course of the series development of a headlamp, light samples are assembled and prototypes created. These are tested in virtual test environments as well as in real road traffic. The development of a dynamic, high-resolution headlamp is time-consuming, the construction of prototypes cost-intensive. The "Smart Headlamp Technology" research project is therefore investigating a three-stage development process. First, the driving simulator dynamically displays the headlamp and vehicle environment in order to assess the lighting functions. The headlight functions developed can then be validated using virtual test drives. This simulative approach is supported by the construction of a hardware-in-the-loop test rig in the light testing facility. This means that real light distributions, lighting functions and possible improvements can be



evaluated and analyzed as early as the initial stages of product development. It is only after these results have been assessed that HELLA finally builds a high-resolution LED headlamp prototype with integrated solutions for condition monitoring and self-healing measures and integrates it into a vehicle. Finally, the functions are tested in real road traffic. The data collected here then flows back into the development and product optimization process.

Thanks to the three-stage process, development loops can be reduced in the future and the optimum performance of HD headlamp systems can be ensured in the long term.

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