

PRESS RELEASE

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Multi-functional laser tools for lightweight construction and e-mobility

Cutting, welding and additive manufacturing with one laser in one machine – this innovation, which gives the sheet metal processing industry significant productivity and quality advantages, is the focus of MultiPROmobil, an NRW Leitmarkt Project. Four partners are developing multi-functional laser tools to master the changing production and technical challenges of new, electric vehicle designs. The Fraunhofer Institute for Laser Technology ILT is coordinating the project, which started on November 15, 2018 and will appeal in particular to small- and medium-sized companies.

Fast-changing products, fluctuating batch sizes and innovative production concepts: Hybrid lightweight construction and electromobility require a balancing act between flexibility and productivity. “In volatile markets, laser technology combined with digitalization is a predestined enabler for cost-effective production”, explains Dr. Dirk Petring, group leader for Macro Joining and Cutting at Fraunhofer ILT and coordinator of the joint project “Multifunctional robot technology with a universal laser tool for separating, joining and additive manufacturing processes in semi-bionic lightweight e-mobility – MultiPROmobil”.

Clever combi-head: efficiency thanks to lasers and robots

Together with Bergmann & Steffen GmbH, CAE Innovative Engineering GmbH and the Laser Processing and Consulting Centre (LBBZ GmbH), Fraunhofer ILT is developing a multi-functional laser processing head and robot technology for the flexible and economical production of sheet metal component assemblies.

A combi-head from Laserfact GmbH is used, one that the scientists have continuously developed over the last few years. In the future, this head will not only enable users to integrate cutting and welding but also to additively generate structures. The latter process already works with a replaceable nozzle module. The project partners are currently working on optimizing the combi-head in such a way that it can execute all three processes in a production plant “on the fly” – i.e. without changing the optics or nozzles.

The project is also focused on developing intelligent design and simulation software for an optimized process chain. With “Digital Twins”, the project partner CAE Innovative Engineering digitally can image machines, processes and components to be produced so that key figures of the process chains can be identified and improved.

Editorial Notes

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Using the highly flexible process chain, the MultiPROmobil partners can digitally display new vehicle components, then test and evaluate the developed technology. In an industrial environment at project partner LBBZ, a robot that masters all three manufacturing disciplines will produce semi-bionic vehicle structures with a laser. As the first application example, the triangular control arm of an electric vehicle will be optimally designed and cut, then welded and reinforced with additive structures in the multifunctional laser robot cell, all without a single tool change. Of particular importance here is the flexibility of the clamping technology developed by Bergman & Steffen GmbH. In the future, several multifunctional robots are to be used in highly flexible manufacturing cells, depending on the size of the assembly and the required cycle time.

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Laser-based manufacturing for more efficiency and lower costs

The project partners predict that engineering efficiency can be increased and startup times reduced by around 30 percent each. In addition, they want to reduce unit costs and resource consumption by at least 20 percent each. "With agile, laser-based manufacturing, process chains for the production of sheet metal assemblies can be made very flexible and scalable so that they can be gradually introduced into electromobility applications", explains Dr. Petring.

The technology invented at Fraunhofer ILT with the combination head from Laserfact is already being used in the industry, for example when cutting and welding strip ends in coating and inspection lines of the steel industry, as well as when producing high-precision metal assemblies. With the further development of the combi-head, MultiPROmobil will now appeal, in particular, to small- and medium-sized companies that make an important contribution to the future market of e-mobility.

The MultiPROmobil project will run for three years, is coordinated by Fraunhofer ILT and funded by the European Regional Development Fund (ERDF) and the State of North Rhine-Westphalia.

Fraunhofer ILT at the LASER World of PHOTONICS 2019

Visitors can learn more about MultiPROmobil and other current developments at the joint Fraunhofer stand, 431, in Hall A2 at the LASER World of PHOTONICS in Munich from 24 to 27 June 2019.

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Image 1:
Multifunctional laser processing head that can already cut and weld innovative sheet metal assemblies. Now, additional additive manufacturing steps are added.
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Image 2:
Processing of an automotive structural component with the multifunctional laser tool.
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