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MULTIFUNCTIONAL LASER TOOLS FOR LIGHTWEIGHT CONSTRUCTION AND ELECTROMOBILITY

Task

Highly varied products, changing batch sizes and new production methods require extremely flexible manufacturing concepts. In this context, laser technology – combined with digitalization – is predestined for solving various issues of economical production. In the MultiPRO-mobil project, Fraunhofer ILT is developing a multifunctional laser processing head and robot technology for the flexible and economical production of components in the field of electromobility.

Method

Based on analyzing the requirements for production and component properties, Fraunhofer ILT first integrated the cutting, welding and additive production processes into one processing head. A combi-head was used, with which the various processes can be carried out without needing to retool the system. Serving as an application example is the triangular control arm of an electric vehicle, which is to be processed in a multifunctional laser robot cell. A flexible clamping technique is used to securely hold the components during production. Digital twins are used to map the machine, processes and component, thus enabling virtual commissioning.

Results

A multifunctional processing head was designed as a tool to solve the manufacturing task. The construction of a laboratory sample has been completed; special features are an optical system for flexibly adapting the beam properties to the requirements of the three different processes as well as for the functions of supplying the gas and additives. The robot, clamping fixture and laser technology are networked in the production cell and implemented as digital twins to optimize the production tasks.

Applications

The further development of the combi-head in the MultiPRO-mobil project shows potential, in particular, for small and medium-sized enterprises that want to make an important contribution to the future market of electric mobility. In the future, several multifunctional robots will also be used in highly flexible production cells. This will allow process chains to be designed in a very flexible and scalable way with a view to the gradual introduction of electromobility.

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3 Set of characteristic curves
of beam distributions for
additive manufacturing steps.