



MODULAR PRODUCTION CHAIN FOR PLASTIC OUTER SHELL COMPONENTS OF VEHICLES

Task

As vehicles become more and more individualized, their production requires flexible manufacturing processes – especially in small series models – that enable the industry to design and equip automobile components in a modular fashion. Using the electric vehicle StreetScooter, Fraunhofer ILT shall identify and optimize new laser-based processes in terms of potential cost reductions.

Method

In this project, three models of StreetScooter were used to test the concept of modular component manufacturing. The StreetScooter's exterior mirror mounts differ in the number of ducts they have (Figure 1). Through a modularization of the production chain, the base plate and ducts were initially injection molded separately. The required openings were cut into the base plates with laser machining processes and the ducts welded into them with transmission welding. By a suitable choice of dyes and absorbers, homogeneous color can be created in the part and, simultaneously, a good weldability guaranteed to join both parts with an invisible seam. Finally, a metal-plastic hybrid connection was generated; the necessary

connection elements were then structured in the metal on its underside so that it can be connected with the base plate by means of positive locking. Thanks to indirect heating, the plastic melt penetrates into the structures inserted in the connection element and forms a firm connection after it cools.

Result

Based on laser machining processes, the modular production chain makes it possible to significantly reduce the number of required injection molds and, thus, the manufacturing costs of the mirror triangles with a constant variance in the component.

The proposed process chain was developed within the project »KMUProduction.NET: SME-friendly Production of Electric Vehicles and Components in NRW« (grant number: 300109102). This project's overall goal is to develop practical and cost-effective solutions for manufacturing, thus enabling small and medium-size enterprises to produce components, electrical parts and minicars.

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1 Various models of the StreetScooter.

2 Welding the duct to the base plate.