Research project / master / diploma thesis topic

Topic: **Development of a simulation strategy for recycling processes of multi-material structures in LS-DYNA**

Aim:

The sustainability of materials and processes is playing an increasingly important role in lightweight construction due to climate change and resource availability challenges. An important topic is the recycling of (fiber-reinforced) plastics and hybrid multi-material structures. Materials combined in multi-material structures need to be liberated (=disconnected) again during the end-of-life phase through shredding. Efficient liberation enables high material recovery rates in subsequent recycling processes. Recovered materials can be used for the production of new structures, thereby reducing waste products and the need for new primary resources. For multi-material structures, complete liberation of materials is particularly relevant. Simulation methods should be applied here to better understand material breakage and liberation phenomena during shredding and to allow conclusions on the effect of design decisions on material liberation and recyclability.

The aim of this work is to create a simulation model for a selected recycling process of a multi-material structure and to carry out a parameterized simulation study in LS-DYNA.

Tasks:

1. Familiarize with the topic and LS-DYNA software
2. Review literature on recycling processes for fiber-reinforced plastics and hybrid materials and application cases in process simulation
3. Create a simulation model for the shredding process of selected specimen geometries
4. Carry out simulations with different process parameters and boundary conditions
5. Summarize and provide outlook

*Further notice: The requirements of the Institute for Lightweight Construction and Polymer Technology, Faculty of Mechanical Engineering apply to the preparation of the thesis.*

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