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NeLiPro

"Next Level Lightweight Production"

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// 01 Research Goal

The joint project NeLiPro is developing the manufacturing technology for a modular system of hybrid lightweight fiber composite components for use in commercial vehicles.
The project is divided into four subprojects. The subproject on "Sustainability" is lead by IZNE and investigates the integration of LCM in product an process development by:

- ongoing LCA-based evaluation of products an processes based on DIN EN ISO 14040/44 throughout the entire R&D phase
- early identification of critical resource consumption and potential environmental impacts in the value chain
- development and evaluation of appropriate measures to improve the environmental impacts
- demonstrating methods for achieving a CO_2-neutral value chain

// 02 Research Background

- due to their high mileage during the service life, lightweight commercial vehicle components offer:
  - a high level of fuel economy
  - extension of the range or compensation of heavy electric drives and energy storage systems
  - an increase in the payload
- new product design enables optimum use of materials and high lightweight potential with significantly lower energy input in production

// 03 Research subject

A modular system (Figs. 1 and 2) was developed based on an adhesive bonding process which connects two metallic load introduction structures with an FRP-profile. Depending on the size and load of the components, a mass saving of between 30% and 50% can be achieved. The planned automated production of these components offers a large efficiency potential, e.g. due to a significant reduction of process forces, a considerably lower heat capacity and lower process temperatures.

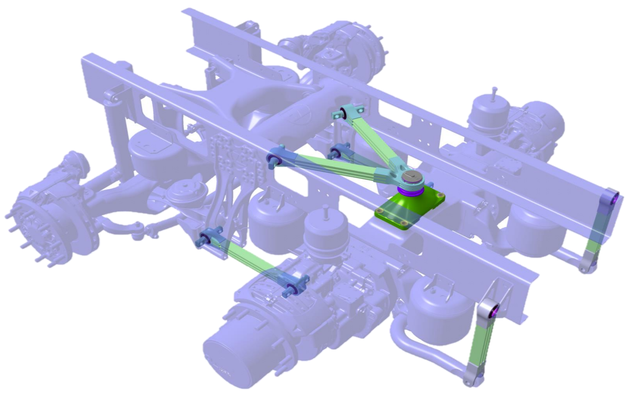

Fig. 1: Generic commercial vehicle chassis of a rear axle with lightweight modular components [1]

Fig. 2: Built-in lightweight modular component [2]

// 04 Research approach

The pilot application for the modular system is a commercial vehicle stabilizer whose life cycle phases are being investigated with respect to their environmental impact. Different production variants are identified and their ecological impact quantified. This allows to prioritize environmentally compatible technologies in an early stage of product development. The results of the sub-project will be actively used to implement the process chain and components in series production, thus making a direct contribution to achieving the EU climate targets and protecting the environment.

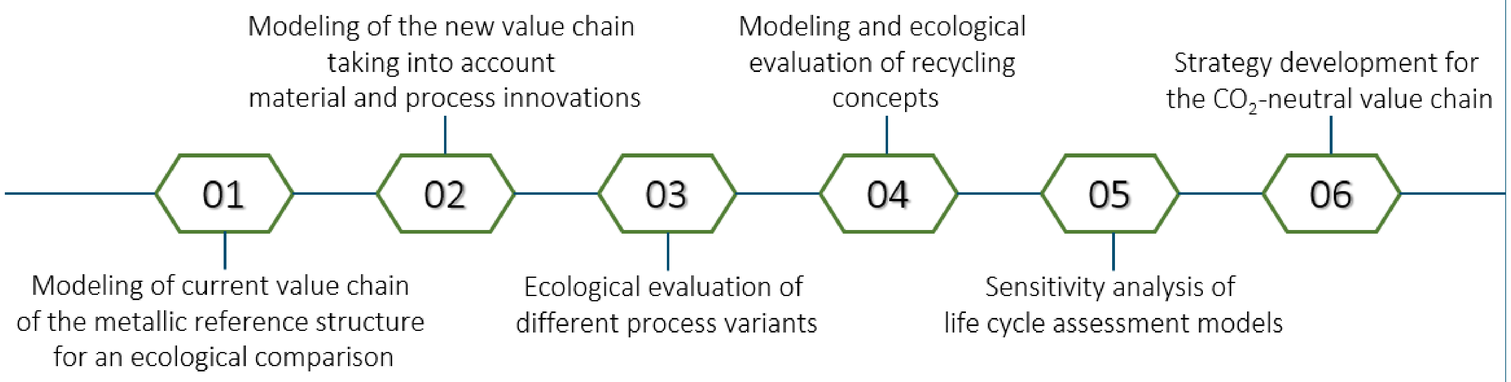

Fig. 3: Sequence in the "Sustainability" subproject

References:
[1] ZF Friedrichshafen AG (author of the image)
[2] ZF Friedrichshafen AG – Press release from 06.10.2020 - ZF auf der Überholspur für intelligente, saubere und sichere Nutzfahrzeugtechnik – ZF