

Design for Circularity: Disassembly Study and Development of Design Requirements for the Electric Drive Unit of E-Trucks

Initial Situation

The high resource consumption in Germany exacerbates environmental problems in global value chains. In addition, Germany's dependence on raw material imports jeopardizes its position as a business location. The circular economy offers a solution to this problem if it is conceived and implemented holistically. In the research project "Application potentials of the circular economy in the commercial vehicle sector", a concept is being developed in cooperation with MAN Bus & Truck SE that enables vehicle development to take circular economy approaches into account in vehicle design.

Objective and Approach

An electrified drive unit will be dismantled to record the current situation of the component design. As part of the master's thesis, the documentation of the dismantling process is to be evaluated and the following points are to be worked on:

- Thematic familiarization with the electric drive unit of trucks, disassembly processes, design for disassembly/remanufacturing/circularity (literature research, familiarization with the parts catalog of the disassembled component)
- Participation in a disassembly study to document the disassembly process and disassembly friendliness of an electric drive unit at the MAN Remanufacturing Center in Nürnberg
- Application of a (already developed) method to evaluate the degree of circularity of the current component design

- Development of design for circularity requirements to improve the disassembly friendliness and circularity of the component



Picture: Exemplary representation of a synchronous motor
(Vitesco Technologies)

Requirements

- Interest in hands-on work and circularity/sustainability
- If possible, experience in vehicle design, dismantling, circular economy
- Independent and structured way of working
- Good knowledge of German (however, thesis can be written in English or German).

The work should be completed as a Master's thesis. As confidential data will be handled, the student will be **employed by MAN** as a master's student. The expected official start date at MAN is **01.05.2025** and the contract is valid for 6 months.

Contact

Carolin Escherich, M.Sc.
Lehrstuhl für Fördertechnik Materialfluss Logistik
carolin.escherich@tum.de