PRESS RELEASE

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Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University

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REVAMP Research Project Aims to Industrialize Remanufacturing of Commercial Vehicle Batteries

Remanufacturing of Variant-Rich Battery Modules With Automated Assembly And Testing Processes

The recently launched REVAMP project aims to automate the process of assessing the condition of used vehicle batteries. With this knowledge, batteries are to be economically reconditioned for subsequent use in the vehicle (2nd-use) or for other purposes (2nd-life). A consortium of nine partners from industry and science is involved in the project, which is funded by the German Federal Ministry of Economics and Climate Protection (BMWK). The consortium leader is MAN Truck & Bus.

- Using automated dismantling and testing processes to prepare commercial vehicle batteries for their subsequent use
- Goal: Economical remanufacturing
- REVAMP launched in February 2023, project duration: three years

With the ramp-up of electromobility, a strong increase in used batteries is expected in the future. After the first use of the energy storage units in trucks, buses or vans (1st-life), there are basically various options for a second use: reuse in the vehicle (2nd-use), use in another application (2nd-life), e.g. as stationary buffer storage units, or as a last option recycling to recover the valuable raw materials. Of these options, reprocessing the battery components for a second use represents an ecological and economic alternative.
This is the goal of the new research project REVAMP (Remanufacturing of variant-rich battery modules with automated assembly and testing processes). The project is funded by the German Federal Ministry of Economics and Climate Protection (BMWK) as part of the funding measure for "Research in Priority Funding for Battery Cell Production". The aim is to increase the utilization rate for 2nd-use and 2nd-life batteries in Germany. The project is supervised by the project management organization VDI/VDE-IT. The basis for this process, known as remanufacturing, which already exists for remanufactured engines or vehicle components, for example, is the condition assessment and automated dismantling of battery returns as the core aspect of REVAMP. On this basis, remanufacturing, reassembly, testing and the reintroduction of the battery into the market are subsequently explored.

Overall consortium consists of research institutes, system providers, first-use and second-life users

The Laboratory for Machine Tools and Production Engineering (WZL) and the Institute for Power Electronics and Electrical Drives (ISEA) at RWTH Aachen University are involved in the REVAMP project. The Fraunhofer Institute for Production Technology (Fraunhofer IPT) and the Fraunhofer Research Institution Battery Cell Manufacturing FFB are also part of the project. From industry, the following companies are involved: Bertrandt Technikum GmbH, Software AG, IBG Automation GmbH, BE-Power GmbH, Wacker Neuson Produktion GmbH & Co. KG, Weidemann GmbH and MAN Truck & Bus SE as consortium leader.

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Variety of battery states requires flexible remanufacturing system

One challenge associated with the remanufacturing of commercial vehicle batteries is the different aging states when they come back for condition assessment. The fact that the shape, structure and manufacturer of the battery can be different is also one of the challenges of the REVAMP project. Therefore, it is very important that the entire remanufacturing system is designed to be flexible and able to respond to the different states and battery characteristics. To this end, the project is investigating the principle of freely interlinked assembly in simulation studies and developing control algorithms.
The research project is being carried out in eleven work packages: Starting from methodological and theoretical principles, procedures for condition assessment and 2nd-use and 2nd-life planning will be developed. Based on this, methods for the preparation of battery components at pack, module and cell level will be developed. In parallel, flexible, automated disassembly and reassembly will be planned and the corresponding control components will be created.
In addition, a digital twin is being developed to map the entire battery life cycle. This digital twin will also be used for a metrics-based life cycle assessment to evaluate the decisions made for the reuse of the batteries and also to track the sustainability dimensions of remanufacturing. Finally, the results obtained will be validated in application-oriented tests and demonstrated in the eMobility pilot plant at MAN in Nürnberg.

© MAN, Open battery from MAN in which the individual battery modules can be seen

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Laboratory for Machine Tools and Production Engineering (WZL)

The Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University enhances the innovative strength and competitiveness of the industry with trend-setting basic research, applied research and the associated consulting and implementation projects in the field of production technology. In the research fields of manufacturing technology, machine tools, production engineering, gear technology as well as production metrology and quality management, practical solutions for rationalizing production are developed with industrial partners from a broad range of branches.