CIRCULAR MANUFACTURING SYSTEMS PROGRAM (CMSP)

Powered by: **RegioDeal Twente**

The Fraunhofer Innovation Platform for Advanced Manufacturing at the University of Twente (FIP-AM@UT), in collaboration with the regional government and industry partners, has launched the Circular Manufacturing Systems Program (CMSP) to advance sustainable, automated, and efficient production processes. The program strengthens the high-tech manufacturing sector in the eastern Netherlands by promoting circularity across various industries, including energy storage and broader industrial applications.

CMSP focuses on optimising manufacturing through automation, material recovery, and modular product design, fostering collaboration between regional and international partners to drive sustainability and waste reduction. By integrating digital tools and innovative production techniques, the programme enhances efficiency, traceability, and resource management.

A key aspect of CMSP is industrial collaboration. Participating companies gain access to cutting-edge research, technological advancements, and cross-sector knowledge exchange.

Through demonstrators, pilot projects, and training initiatives, FIP-AM@UT ensures that innovations developed within the program are widely adopted, strengthening the region's manufacturing competitiveness and sustainability.

Supported by the RegioDeal Twente, with funding from the Province of Overijssel and the Dutch State, CMSP aims to position Twente as a European hub for advanced manufacturing. The programme stimulates economic growth, attracts talent, and encourages investment in sustainable technologies.

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01_ BattInnovate

with STERN Technologies

The BattInnovate project, in partnership with STERN Technologies, aims to advance **battery module technology for electric motorbikes.** It focuses on optimising energy transfer, automating assembly, and developing circular repurposing strategies to extend battery lifecycles. Key objectives include enhancing cell-to-collector connections to reduce resistance and improve performance, alongside developing durable, high-performance battery cells. The project will pilot an automated Flexible Assembly Line to boost efficiency and quality. Additionally, it will explore repurposing strategies, using a Digital Product Passport (DPP) to track battery health and enable second-life applications. From a sustainability perspective, BattInnovate aligns with the seventh sustainable development goal (SDG) of the United Nations **(Affordable and Clean Energy)** by improving energy storage for sustainable mobility. By minimising waste and enabling circularity, it supports climate goals and a low-carbon economy. The DPP system ensures efficient reuse and recycling, reducing dependency on raw materials. The project also drives **industrial innovation (SDG 9)** by enhancing battery manufacturing through scalable, sustainable processes.

02_ ReLAB

with Riwald Recycling

The ReLAB project, a collaboration between the University of Twente (FIP-AM@UT) and Riwald Recycling B.V., focuses on **reconditioning decommissioned lead-acid batteries (LABs) for low-cost energy storage.** By implementing standardised testing protocols, the project will assess battery state of health and refurbishment potential, establishing a scalable reconditioning framework that includes reconditioning techniques, safety guidelines, and cost-effective improvements. ReLAB directly supports global sustainability efforts related to targeting **UN SDG 7 (Affordable and Clean Energy) and SDG 9 (Industry, Innovation, and Infrastructure)** by helping provide cost-efficient energy storage, extending battery lifecycles, and providing alternatives to achieve industrial energy efficiency. By reducing battery waste and promoting circularity, the project minimises environmental impact, and supports a low-carbon economy. Its outcomes will ensure affordable, scalable, and sustainable second-life battery solutions, contributing to a more resource-efficient energy landscape.

03_ ExtraCycles

with Benchmark Electronics

The ExtraCycles project, in cooperation with Benchmark Electronics in Almelo, focuses on **developing tools and methods to advance circularity principles in battery-related production technologies.** This is achieved through lifecycle interventions during production, maintenance, and disassembly. Firstly, by applying eco-design principles during battery assembly to prevent production errors that lead to waste generation. Secondly, development of tool concepts for battery systems testing to extend their remaining useful life with timely maintenance. Lastly, development of battery pack casing concepts to promote refurbishment and remanufacturing in battery packs in order to extend the lifecycle of battery cells. ExtraCycles aligns with sustainability efforts via **UN SDG 12 (Responsible Consumption and Production)** by reducing waste generation through prevention, reduction, recycling and reuse in battery production, use, and disassembly.

04_ MoCoSo

with Beckhoff and IMS

The MoCoSo project, a collaboration between the University of Twente (FIP-AM@UT), Integrated Mechanization Solutions B.V. (IMS) and Beckhoff B.V., focuses on **developing modular machine software for reuse of assembly equipment.** By developing a software structure for reuse, the project aims to extend the lifespan of materials and production equipment to help prevent hardware waste and avoid additional greenhouse gas emissions from producing new components and equipment. By leveraging the modular components embedded in the latest production equipment, such as cameras, robotic arms, and transportation modules, MoCoSo aims to develop an efficient approach for software module reuse. The results from MoCoSo contribute to global efforts on **UN SDG 12 (Responsible Consumption and Production)** through the collaboration with manufacturers to implement sustainable strategies that extend their products' lifecycle, reduce hardware waste, and integrate a circular approach to production equipment.