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.

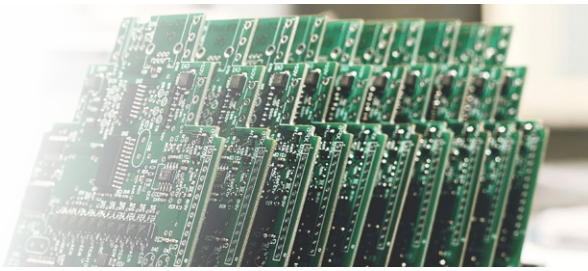
Supported by the RegioDeal Twente, with funding from the Province of Overijssel and the Dutch State, CMSP aims to position Twente as a European hub for advanced manufacturing. The programme stimulates economic growth, attracts talent, and encourages investment in sustainable technologies.

Rijksoverheid

provincie Overijssel

Twente Board

06_ CyclePCBA
with DeltaProto



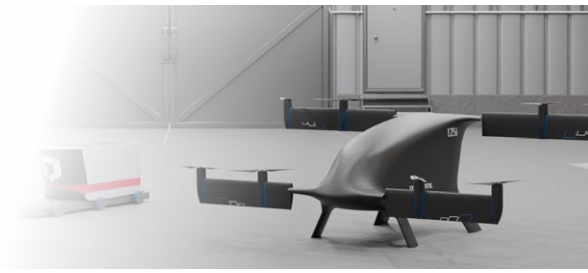
The CyclePCBA project, developed in collaboration between FIP-AM@UT and DeltaProto, aims to **modernise quality assurance in high mix, low volume PCBA production by enabling earlier and more reliable image-based defect detection.** As PCBAs continue to incorporate increasing numbers of miniaturised components, traditional visual inspection methods struggle to identify subtle faults in time to prevent unnecessary waste.

CyclePCBA addresses this challenge by developing a proof-of-concept software stack capable of extracting component-level features from surface-captured images and recognising failure types such as misplacements, misalignment and tombstoning. This early insight enables operators to intervene before electrical testing reveals faults that may already have caused irreversible damage, supporting greater circularity and digitalisation within electronics manufacturing.

The project strengthens automation, sustainability and efficiency by reducing material consumption, improving component reusability, and establishing a scalable digital inspection method suitable for regional manufacturing environments. It also generates valuable insights into rapid defect detection and intelligent surface inspection, supporting wider knowledge sharing and industry adoption.

CyclePCBA advances **UN SDG 12 by minimising waste during production and SDG 9 through enhanced industrial innovation.** Overall, the project helps build more resilient and resource-efficient electronics manufacturing processes.

07_ L-UCAS
with LogiXair



L-UCAS, a project partnership between FIP-AM@UT and LogiXair, focuses on **developing lightweight and recyclable composite materials for the next generation of unmanned cargo aircraft.** As UAV logistics platforms expand, there is a growing need for structural materials that combine low weight, high durability and improved sustainability. Conventional carbon-fibre thermoset composites provide strong mechanical performance but are energy intensive to produce, costly and difficult to recycle, creating clear limitations for circular aviation.

L-UCAS addresses this challenge by establishing a digital framework for virtually exploring bio-based fibres, recyclable thermoplastics and hybrid composite configurations. Through multiscale material modelling, topology optimisation and finite-element analysis, the project identifies material–structure combinations that reduce weight while meeting aerospace performance standards. This virtual-first approach enables rapid screening of sustainable materials, early optimisation of UAV components such as spars and fairings, and the integration of circular design principles through the development of digital material passports.

In doing so, the project supports broader regional ambitions to strengthen circular manufacturing capabilities, reduce environmental impact and encourage the adoption of sustainable, data-driven engineering methods. Its focus on recyclable materials, lightweight design and digitally enabled decision-making aligns with efforts to advance automation, sustainability and resource efficiency across the manufacturing value chain.

By improving understanding of recyclable composites and enabling energy-efficient UAV structures, L-UCAS advances **SDG 12 through responsible material use and SDG 9 through innovation in industrial design processes.**

Learn more about other CMSP projects on the AMC NU section from InnovatieNU 14th and 15th edition!

v.s.blokhuis@utwente.nl +31 53 48 94161 ***Vincent Blokhuis***