EuReComp

EUROPEAN RECYCLING & CIRCULARITY IN LARGE COMPOSITE COMPONENTS

Newsletter 05

May 2025

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Dear Reader,

Welcome to Issue #5 of the EuReComp Newsletter!

In this edition, we are delighted to highlight the latest progress from Work Package 4 (**WP4**) and Work Package 7 (**WP7**), each playing a key role in advancing circular economy strategies within the composite materials industry. WP4 focuses on innovative recycling methods, investigating three advanced solvolysis technologies to recover high-quality carbon fibres from CFRP materials. These fibres can then be effectively reused, significantly enhancing resource efficiency and supporting sustainable manufacturing practices. Simultaneously, WP7 concentrates on knowledge transfer and lifelong learning, successfully launching an interactive e-learning platform featuring structured courses, engaging quizzes, and comprehensive scripts, all designed to disseminate EuReComp's innovations and best practices. Together, these initiatives actively contribute to reducing environmental impacts and promoting widespread adoption of circular economy principles across the industry.

Enjoy exploring the achievements within EuReComp, and stay connected through our website and social media channels!

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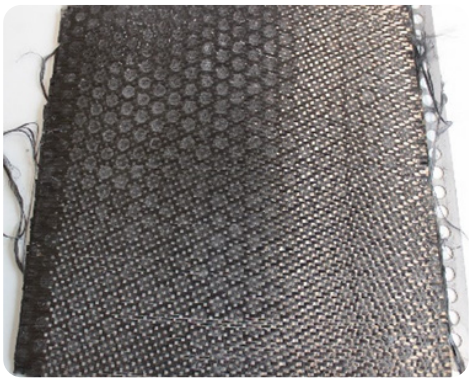
WP4: Circularity by Recycling and Reclamation

WP4 is central to EuReComp's mission, developing advanced recycling technologies for carbon fibres from carbon fibre reinforced polymers (CFRP), thus enabling effective circular strategies for composite materials. Three innovative solvolysis methods have been scientifically investigated at lab scale:

- **Chemically-assisted solvolysis**, scaled up successfully to pilot-scale, demonstrating its feasibility for industrial-level applications. This process safely produced high-quality continuous yarns, short fibres, and fabric patches, using environmentally friendly solvents and catalysts.

Pilot scale Solvolysis Reactor

Chopped Fibres



30x30 cm recycled fabric patches

- **Plasma-enhanced solvolysis** shows reduced emissions and approximately 50% recovery of produced NOx gases, resulting in fibres with properties comparable to virgin carbon fibres. Recovered fibres were successfully used in additive manufacturing (see Figures: "Plasma solvolysis reactor and wet scrubbing system" and "Recycled 3k carbon fibre for 3D printing").

Dissolving composite tubes

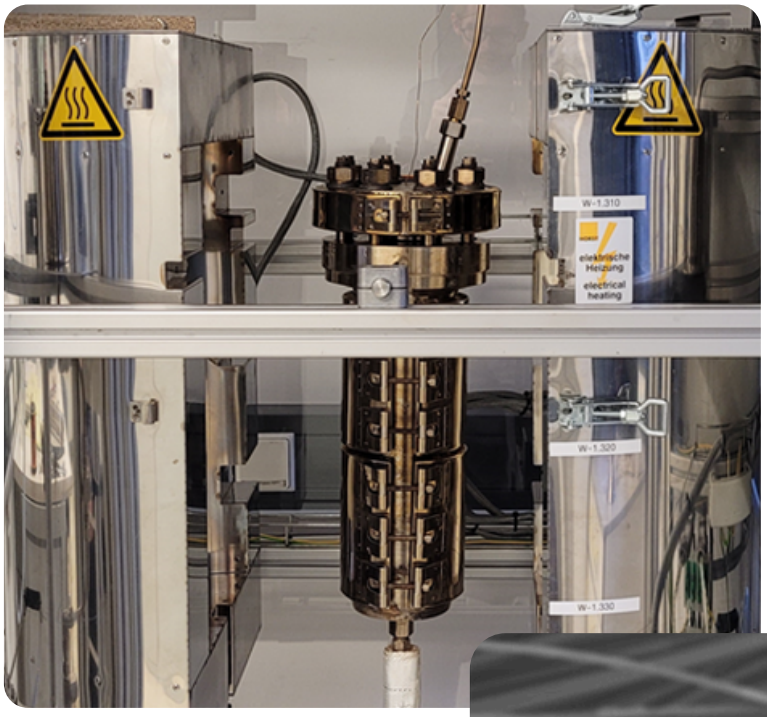
Recycled 3k carbon fiber for 3D printing at BioG3D

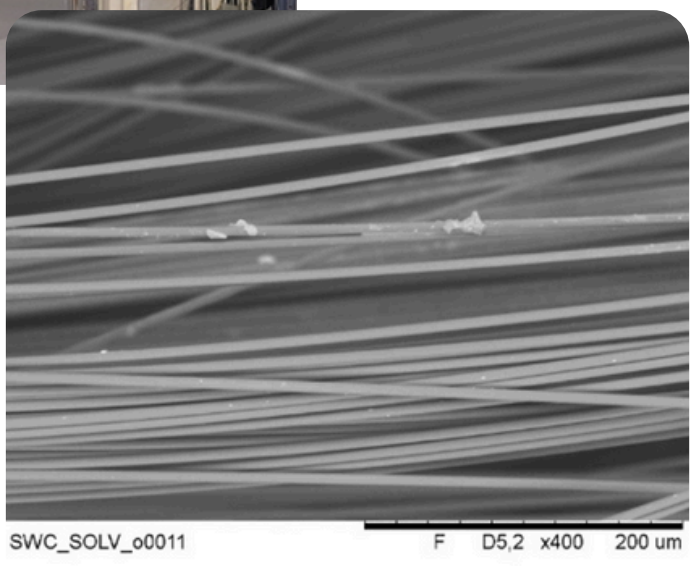
lets connect!

WP4: Circularity by Recycling and Reclamation

- Sub- and supercritical water solvolysis, which facilitated the recovery of fabric patches and continuous carbon fibres, supported by detailed process optimization through molecular dynamics simulations developed by POLITO. This allowed a deeper understanding of solvent-composite interactions (see Figures: "SCW reactor at TUD" and "SEM images of SCW recycled CF").

SCW reactor at TUD



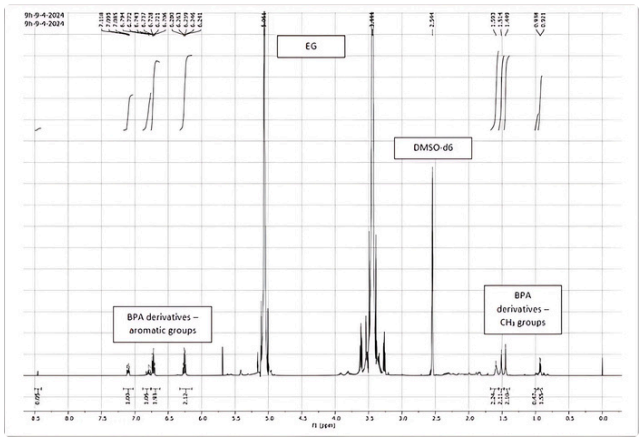


SEM images of SCW recycled CF

WP4: Circularity by Recycling and Reclamation

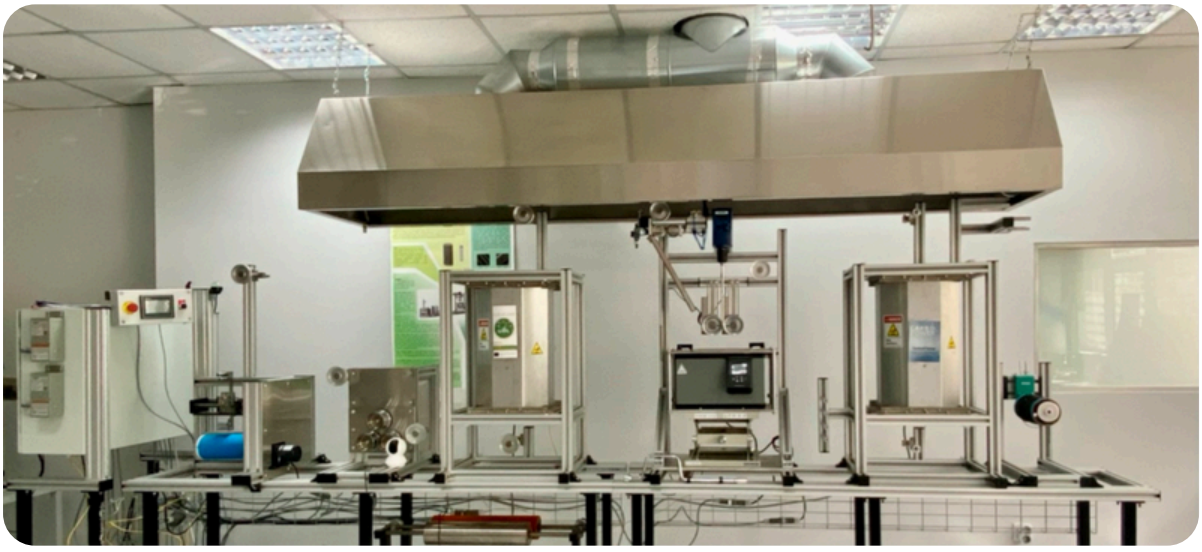
Furthermore, detailed analyses of the solvolysis solutions (performed by NTUA and SUT) confirmed the potential for solvent reuse and identified key variables affecting the quality of recycled materials .

Liquid samples of different solvolysis experiments



NMR analyses of liquid samples

NTUA notably transformed matrix residues into carbon nanostructures to improve fibre resizing. Additionally, a pilot-scale fibre sizing line was established, successfully preserving structural integrity and mitigating negative recycling impacts on fibre properties.



Sizing line for continuous CF

WP4: Circularity by Recycling and Reclamation

- ***What's Next for WP4***

In the upcoming months, WP4 will focus on further optimizing lab-scale solvolysis processes to enhance fibre quality and improve recycling efficiency. Key activities include finalizing solvent purification techniques and exploring the effective utilization of matrix by-products. Additionally, ongoing experimental work will generate critical data required for the validation of developed simulation models, ensuring accurate process understanding and scalability.

- **Contribution to the EuReComp Scope:**

WP4 is essential to achieving EuReComp's vision of a sustainable circular economy for composite materials. By developing and optimizing innovative solvolysis technologies and fibre treatment methods, WP4 bridges the gap between composite waste streams and the manufacturing of high-quality recycled composite products. These efforts significantly contribute to the project's overarching goals, enabling effective recycling practices and promoting resource-efficient reuse strategies for carbon fibre reinforced polymers.

Figure 1: Lesson

WP7: Training & Life-long Learning

WP7 plays a crucial role in the knowledge transfer and lifelong learning aspects of composite recycling and circularity within the EuReComp project. By M36, significant achievements include structuring comprehensive educational content and integrating it into an interactive e-learning platform. This platform hosts integrated videos, quizzes, and detailed scripts, ideal for both self-study and organized training sessions.

Key activities involved evaluating storyboards created by project partners, finalizing structured course content, and successfully implementing the first set of courses. Each course consists of clearly defined lessons, covering essential topics such as filament winding processes (see Figure 1), sorting and prevention strategies, and additive manufacturing techniques (Figures 2 and 3). To reinforce learning, interactive quizzes (Figure 4) are incorporated at the end of each course, enabling users to evaluate their understanding and retention of the material.

Specifically, Figure 1 illustrates a sample lesson on Filament Winding, providing structured, detailed explanations combined with visual aids for clarity.

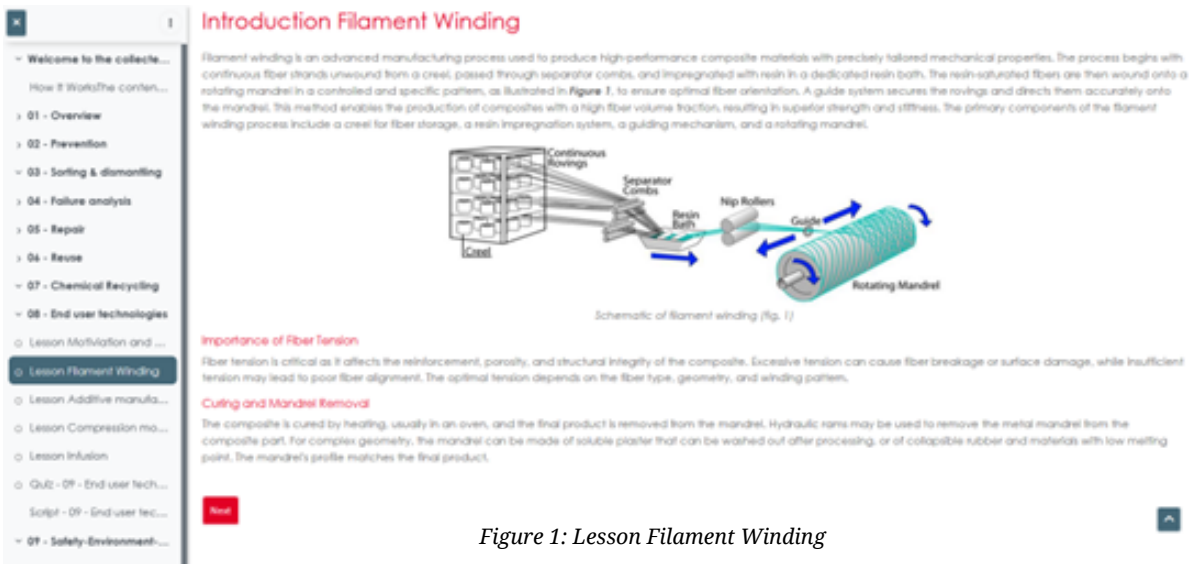


Figure 1: Lesson Filament Winding

WP7: Training & Life-long Learning

Figures 2 and 3 depict examples of interactive quizzes designed to test learners' knowledge on key topics, ensuring active engagement and effective learning. Additionally, Figure 4 shows an excerpt from the additive manufacturing lesson script, serving as valuable supplementary material for further reading and reference.

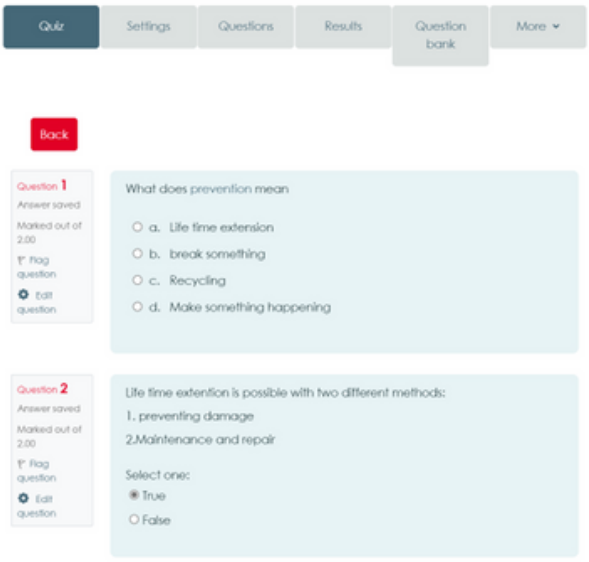


Figure 2: Quiz sample for module prevention and sorting criteria

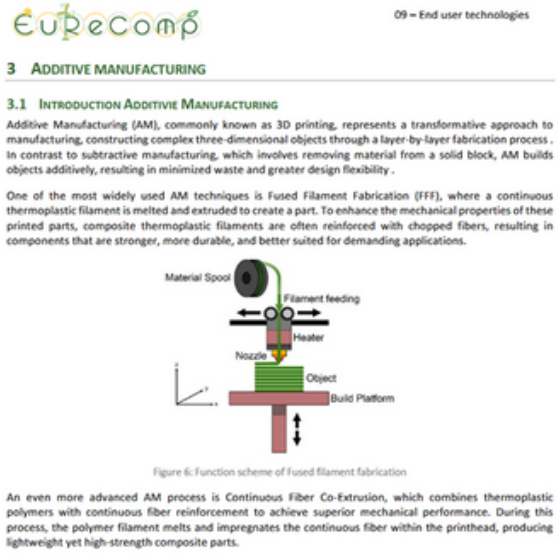


Figure 3: Part of the additive manufacturing script

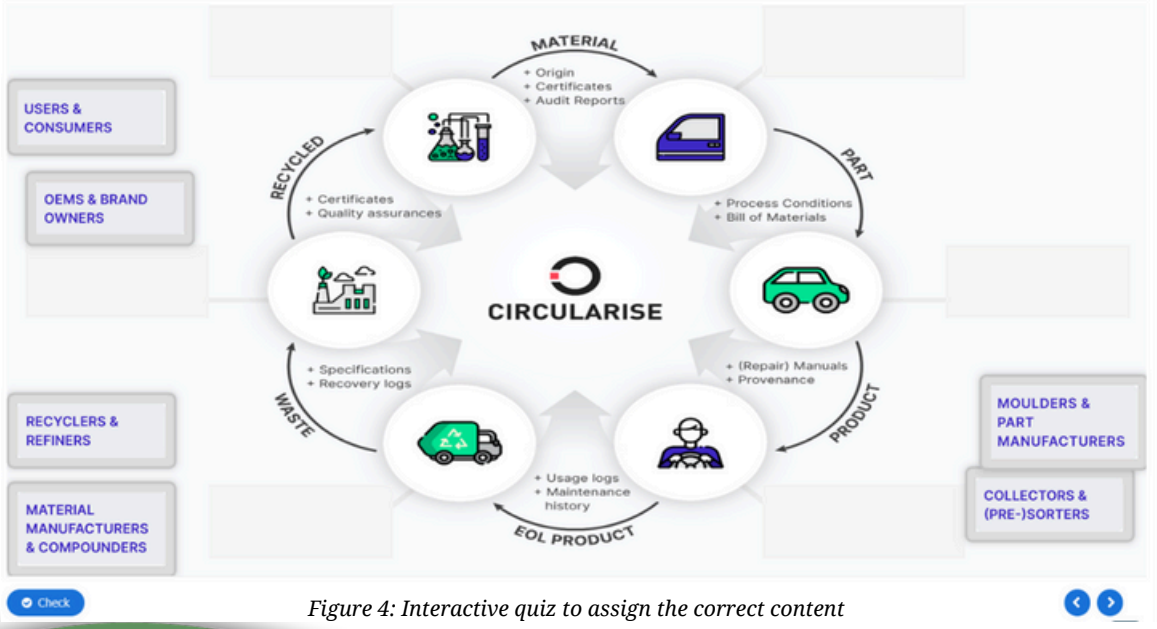


Figure 4: Interactive quiz to assign the correct content

WP7: Training & Life-long Learning

- *What's Next for WP7*

By October 2025, WP7 will finalize the complete suite of interactive e-learning courses on the platform. Following this, WP7 plans to conduct comprehensive evaluations with students from participating universities, collecting feedback to enhance and refine course content and usability. This evaluation phase will ensure the courses meet educational objectives and effectively disseminate project outcomes.

- **Contribution to the EuReComp Scope:**

WP7 plays a crucial role in promoting knowledge transfer and lifelong learning within the EuReComp project. By developing and providing accessible, interactive online educational resources, WP7 ensures that the innovations and best practices generated by EuReComp are effectively communicated to a broad audience, including students, industry professionals, and educators. This substantially supports the project's objectives of advancing circular economy principles and fostering a skilled workforce equipped for sustainable composite recycling.

The 3rd Open Workshop of EuReComp!

The 3rd EuReComp Workshop took place on **March 19, 2025**, hosted by the National Technical University of Athens (NTUA), gathering experts from research, industry, and policy to explore the future of sustainable composite recycling.

Throughout the day, participants had the opportunity to attend a series of insightful presentations covering key topics such as:

- Large-scale recycling of wind turbine blades (***REFRESH Project***)
- Development of recyclable, multifunctional composites (***REPOXYBLE Project***)
- Advancing bio-based composites for industrial applications (***R-LIGHTBIOCOM Project***)
- Circular economy strategies for construction and composite materials (***Blades2Build Project***)
- Decision support systems for enabling circular strategies (***RECREATE Project***)

The workshop also provided a platform for interactive discussions, networking, and collaborative exchanges among attendees from across Europe. Both physical and virtual participants contributed to vibrant conversations about practical solutions and research-driven innovations leading toward a more circular and sustainable composites industry.

Events / Conferences / Exhibitions

The EuReComp project team embarked on a journey to Athens, Greece for our 3rd Review Meeting.

EuReComp team successfully participated in the JEC 2025 Exhibition

The Team Series! Get to know the people behind EuReComp!

EuReComp Featured in Composites in Manufacturing Magazine!

The EuReComp Webinar Series continues.

lets connect!

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Our Team

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01.04.2022

48 months

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