

Re-use of Thermoset Composites

Dr. Ir. Albert ten Busschen
Assistant Professor for Polymer Engineering
Windesheim University of Applied Sciences

Executive summary

The Windesheim methodology of Structural Re-use of End-of-Life (EoL) thermoset composites is a circular solution for the thermoset composite industry. It produces new composite products from EoL material. This saves the use of valuable new (virgin) raw materials and benefits from the favorable properties of the EoL material still present at the end of its lifespan. Using this methodology, EoL composites from wind mill rotor blades and polyester boat hulls can be transformed into new composite products, typically suitable for infrastructural applications, profiting from high mechanical strength and long-term durability. Full-scale demonstrators have proven the technical viability. Cost efficient production has been developed and scale-up is now taking off. Considering the life cycle (LCA) of thermoset composites, the method is the right direction to create sustainable circularity.



Full-scale demonstrators: retaining wall and guiding structure.

Technical aspects of the method summarized

With the method of structural re-use the basic composite structure is left intact. The EoL product is processed into smaller elements, like strips or flakes with a high L/D ratio, but these still contain the original composite properties. The elements have to be embedded in virgin resin to create a consistent and strong new product and must have a virgin composite outer layer to prevent crack-initiation from the outside during its service life. This outer layer has been further designed to match the product performance to its end-application. With this method, typically profile-shaped products can be made with high strength and durability for infrastructural applications. For efficient production, a continuous process was developed based on traditional pultrusion. At the end of the service life of these products, the method of re-use can be applied again for the next generation of composite products, allowing for endless circularity. Although a small amount of virgin resin and virgin reinforcement is necessary combined with the EoL elements, the new products can be made with a significant amount of EoL material, typically 70 % by weight of the new product, thus saving the use of new raw materials.

References

Revolutionary re-use of polyester boats

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