

WIR! WIRreFa

V1.3 Manufacture of products from recycled fibres (TP 2)

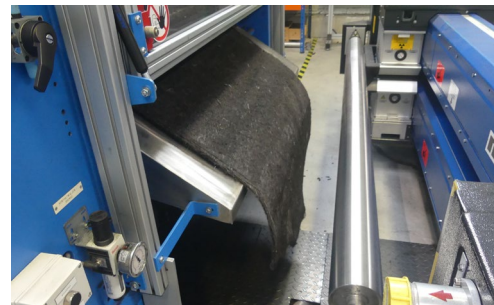
Objective

In subproject V1.3 TP2, strategies and technologies for the production of semi-finished products from recycled carbon fibres were developed. The focus was on the development of semi-finished products, in particular strands and nonwovens made from recycled carbon fibres (rCF). The materials were made available to the partners for product development in the fields of fibre-reinforced plastics (FRP) and concrete construction.

Approach and results

The work in the subproject concentrated on two central development goals:

- the production of rCF nonwovens for fibre-reinforced composite components that do not require certification, and
- the development of epoxy resin-bonded rebars made from rCF strand material for reinforcing concrete components.



Non-woven fabric made from rCF after the carding process

To develop the random-fibre semi-finished products in accordance with objective a), recycled carbon fibres from dry production waste were processed using multi-stage textile engineering processes. Methods such as carding and air-lay technology were employed to produce 14 variants of random-fibre nonwovens. Textile testing was conducted on the nonwovens as well as on the composite properties of the initial laminates and the developed laminates made from rCF materials. Based on the data obtained, material property charts were created, which serve as a reliable data basis for selecting suitable rCF substitutes. The rCF nonwovens developed are suitable as a replacement for conventional carbon nonwovens. Potential areas of application include, in particular, the manufacture of sandwich panels and multilayer structural panels for lightweight construction, automotive engineering, and facade construction.

As part of Objective b), the goal was to develop rebars whose mechanical properties – particularly in terms of tensile strength, fatigue strength, and bending capacity – are comparable to those of primary-fibre-based bars. The prototypical production of epoxy resin-bonded reinforcement bars made from rCF material was successfully implemented. Bundled fibre tapes made from rCF were developed and provided for rebar production.

Acknowledgement

We would like to thank the Federal Ministry of Research, Technology and Space for funding the research project WIRreFa (Reg.-Nr. 03WIR6008B) within the funding programme „WIR! Wandel in der Region durch Innovation“.