

Project title: CarboYarn - Technological comparison of spinning processes for the production of rCF staple fibre yarns

Research Agencies: Institut für Textiltechnik (ITA) der RWTH Aachen University
Deutsche Institute für Textil- und Faserforschung Denkendorf (DITF)
Institut für Textiltechnik Augsburg gGmbH (ITA-A)

Running Time: 1/2018 – 9/2020

Conveyor Carrier: Aif

Univ.-Prof.
Prof. h.c. (Moscow State Univ.)
Dr.-Ing. Dipl.-Wirt. Ing.
Thomas Gries
Head of Institute

Erik Bell
Scientific Assistant

My Sign: EB
22.12.2020

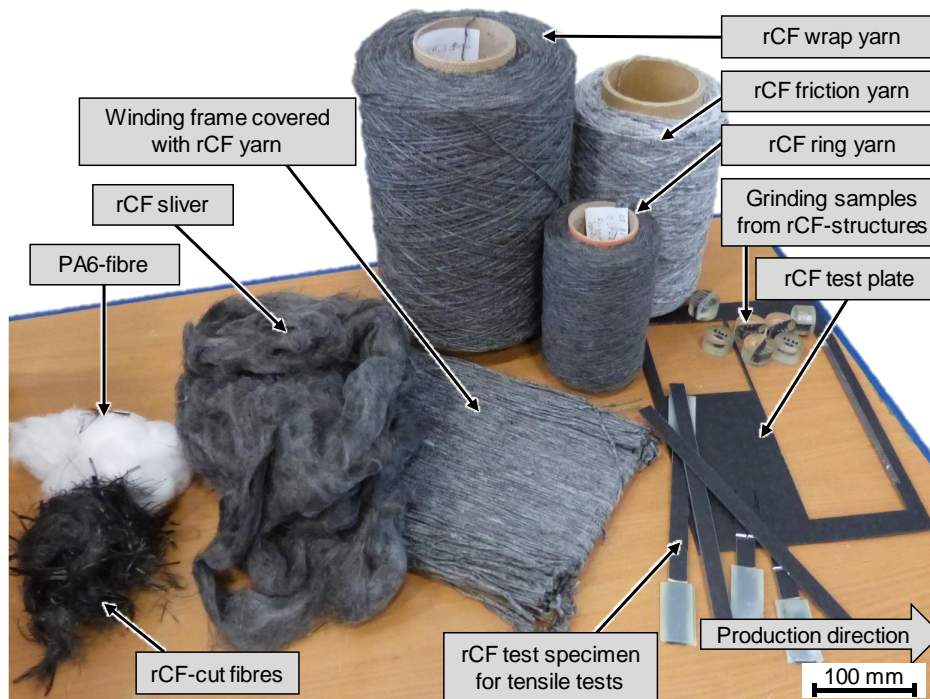


Fig. 1: Products of the individual rCF recycling process steps

Mission Statement

By 2023, a carbon fibre (CF) demand of 197,000 t/a is forecast. Parallel to this, the amount of dry CF offcut is increasing. Furthermore, there is a high energy demand for fibre production.

Currently, there is no alternative to the economic and ecological processing of recycled CF (rCF). Nevertheless, a widespread commercial use of rCF products has not yet been established. First approaches for the industrial use of rCF can be found in the field of nonwoven technology. However, for the production of geometrically complex and high-strength FVW components, endless and oriented structures are required. Previous approaches for the production of rCF yarns are focused on individual spinning technologies and do not consider the entire production chain.

Approach and Aim

The aim of the "CarboYarn" research project was the application-specific, material recycling of rCF (recycled carbon fibres) in the form of staple fibre yarns. The spinning processes investigated were flyer/ring spinning, rotor spinning, friction spinning and hollow spindle spinning with identical spinning preparation.

Project results

In the present research project, the entire recycling process was considered, starting from the raw fibre to fibre preparation, sliver formation, the spinning process and consolidation. During the process chain, the intermediate products were continuously tested in order to quantify the influence of individual process steps on the overall quality of the rCFRP (recycled carbon fibre reinforced plastics). In addition to the process steps, different rCF types were also considered. The rCFs were successfully processed into hybrid yarns in combination with PA6 fibres. All investigated yarn variants (combination of rCF material and spinning process) experienced a strong reduction of the rCF length during recycling. No clear tendency could be shown between the different yarn variants with regard to a dependence of the average rCF length and the spinning process.

The research project carried out increases the experience with the processing of rCF with regard to recycling in staple fibre form and thus increases the currently still lacking market acceptance for the use of the new material.

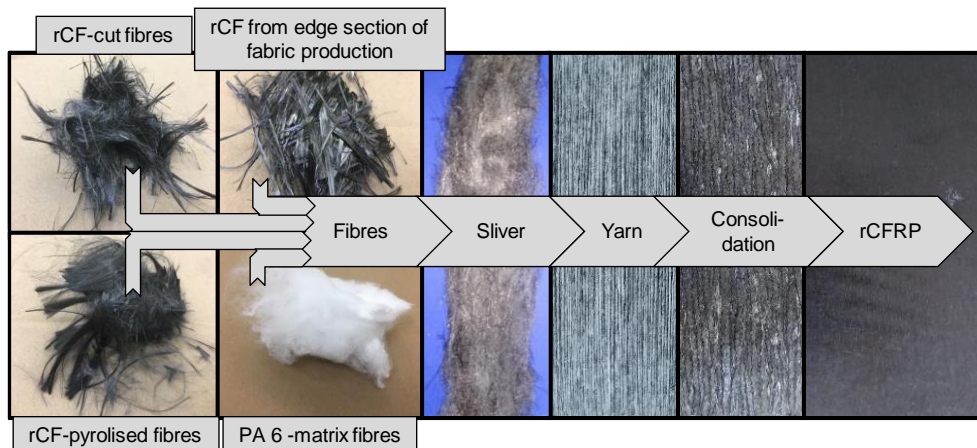


Abb. 2: Processing steps in the fibre recycling of carbon fibres from fibre fluff to rCFRP

Acknowledgement

The IGF Project CarboYarn (Nr. 19814 N) of the Research Association Forschungskuratorium Textil e.V. (FKT), Reinhardtstraße 14-16, 10117 Berlin was supported via AiF within the programme for promoting the Industrial Collective Research (IGF) of the Federal Ministry for Economic Affairs and Energy (BMWi) on the basis of a decision by the German Bundestag.

Contact

Erik Bell

erikgordon.bell@ita.rwth-aachen.de

+49 241 – 80 – 23446

Lukas Lechthaler

lukas.lechthaler@ita.rwth-aachen.de

+49 241 – 80 – 247 06

Gefördert durch:



Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages