

Project Title: Forschungskolleg Verbund.NRW - Verbund im Bauwesen - From resource efficiency to validated sustainability

Partner: FH Münster University of Applied Sciences

Duration: 01/2021 – 06/2024

Funding Agencies: Ministerium für Kultur und Wissenschaft des Landes Nordrhein-Westfalen

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Mein Zeichen: VO
27.01.2021

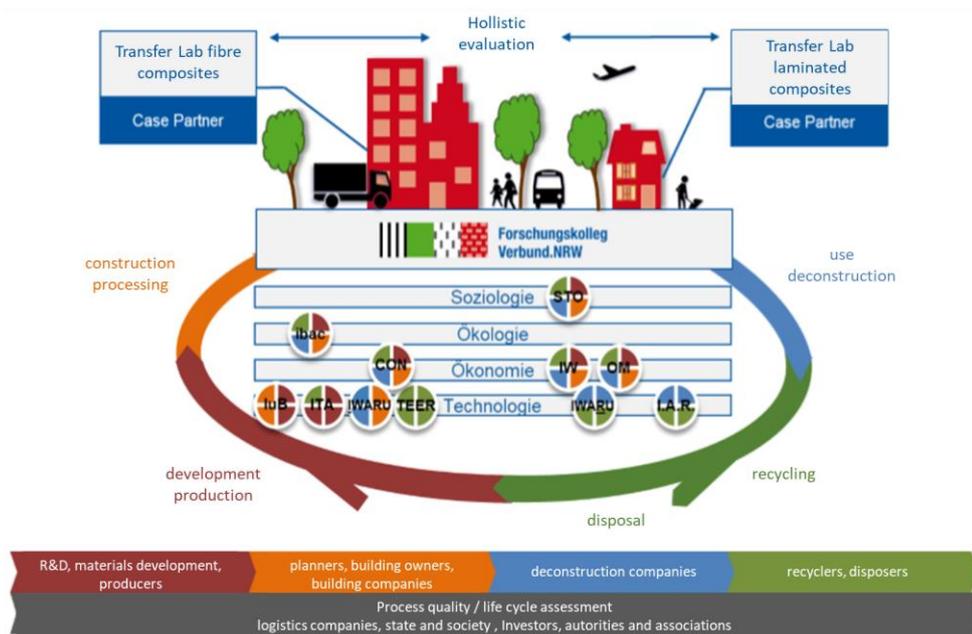
Mission Statement

The building sector is of high societal and social importance (e.g. urbanisation, regional economic impacts, health aspects, affordable, sufficient housing) and also has great resource relevance (50% of resource and 35% of energy consumption, over 50% of waste). As an application-oriented and practice-oriented research college, the Forschungskolleg Verbund.NRW is investigating the sustainable, resource-efficient and cycle-compatible use of complex, multifunctional composite materials in the building sector. Verbund.NRW thus addresses the major social challenge of climate protection, resource efficiency and raw material recovery and conducts research with a view to the following goals for sustainable development:

- Sustainable consumption and production
- Health and ecology
- Industry, innovation and infrastructure

Lightweight construction technologies in general are regarded as innovation drivers for energy and resource efficiency, so that large markets for composite or lightweight construction materials have emerged in the construction sector in Germany in recent years and further growth of these markets is forecast. The development, manufacture and production as well as the use of composite materials in public, industrial and private buildings and infrastructure are of central social, economic and ecological relevance in NRW and Germany. However, the use of complex composite systems must be critically questioned because the materials of the composites can often no longer be separated due to inseparable connections, so that recycling is usually impossible at the end of the life of the composite systems.

Since the beginning of 2016, doctoral researchers from engineering, economics and social sciences have been conducting research in the first funding phase of the Verbund.NRW Research Training Group. In the second funding phase, Verbund.NRW is addressing validation with eleven doctoral projects and two concrete practical application cases, which are considered representative of the broad field of application of the composite systems as joint inter- and transdisciplinary objects of study in "Transfer Labs" (see figure).



The Transfer Lab "Fibre Composites" investigates fibre-reinforced systems that are mainly used as long-lasting special applications in outdoor areas. The Transfer Lab "Laminated Composites" investigates composite systems that are used as mass products with a rather short to medium service life in interior design.

As a research college, Verbund.NRW is characterised by its highly interdisciplinary and transdisciplinary orientation. As a result, numerous practitioners from industry and society are involved in the work of the research college.

Solution

The aim of the dissertation at ITA is the application-specific development of textile semi-finished products made of recycled carbon fibres and bio-based materials for use in statically relevant components for the construction industry. Suitable semi-finished products include staple fibres, tapes, nonwovens or textiles made from staple fibre yarns. This limitation was made on

the basis of the dissertation at ITA in the 1st funding phase, in which the fundamental potential of various semi-finished products, in particular staple fibres and nonwovens, was investigated. In addition, in the 2nd funding phase, criteria such as the approval and quality assurance of recycled materials for the abdominal sector will be taken into account. These specifications for the development of the semi-finished products are defined in close coordination with the academic and regulatory actors involved in the research college in the field of design/processing (e.g. with IuB, ibac) and recycling/disposal (e.g. with TEER, IAR). The implementation on the textile machines at ITA will follow a design of experiment in order to adapt the processes to the above-mentioned requirements.

The evaluation of the new semi-finished products is carried out on the basis of a technological, ecological and economic benchmarking (e.g. with CON) on a technology demonstrator, which is produced together with the practice partners.

The research college is being funded as one of five colleges within the framework of the research strategy of the state of North Rhine-Westphalia, initially for a period of three and a half years until mid-2024.

Acknowledgements

We would like to thank the Ministry of Culture and Science of the State of North Rhine-Westphalia for funding the second funding phase of the research college Verbund.NRW.

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