

Project title: Malleable pre-impregnated textile reinforcement structures for curing in concrete – FreshOnFresh

Duration: 01.11.2018 – 31.10.2020

Funding Agency: AiF

Mission Statement

In the construction sector, a trend towards lighter, resource-efficient components has emerged in recent decades, which textile-reinforced concrete (TRC) can serve. However, the lack of flexibility of current reinforcements, the high price due to the high material input required and the complex approval procedure still prevent broad economic application.

The FreshOnFresh project is therefore developing a process for producing malleable textile concrete reinforcements made of carbon, which only harden after insertion into the component. For this purpose, the concept of prepreg processing from fibre composite plastic technology is adapted to grid-like textile reinforcements for textile concrete. The aim is to reduce the carbon fibre requirement for reinforcement by approx. 30 % (cost reduction at component level of 20 %), cf. Figure 1.

This will increase TRC's competitiveness and open up new markets in which it has not yet been used for cost reasons. The central approach is to increase the flexural strength of formable reinforcements in concrete composites to 30 MPa with the help of a new prepreg reinforcement, which corresponds to the properties of rigid, EP-coated reinforcements. Compared to malleable, SBR-coated reinforcements, this represents an improvement of approximately 50%.

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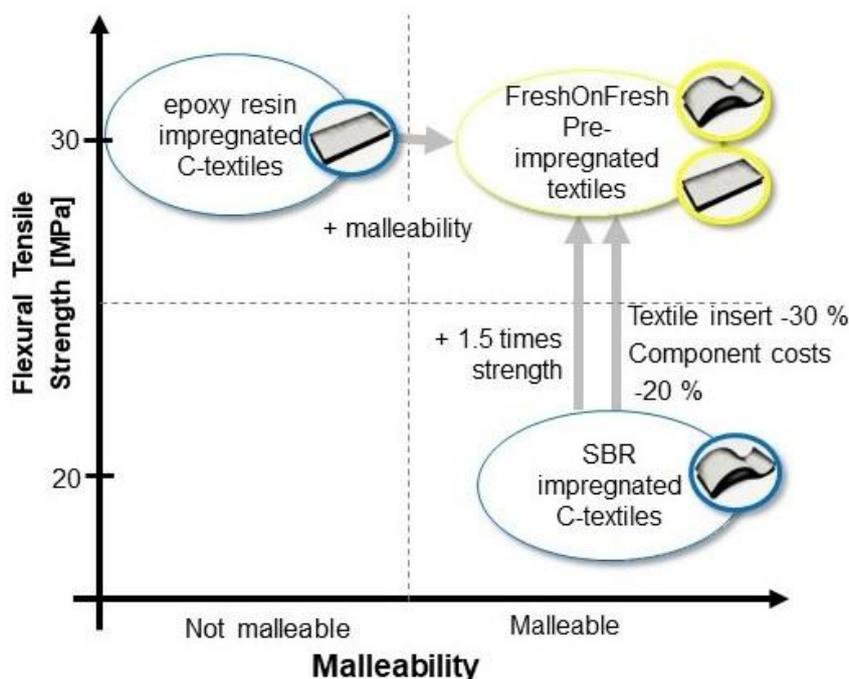


Figure 1: Goal and approach of the project Fresh on Fresh

Approach

From commercially available polymer systems, candidates are pre-selected that are suitable both for integration into TRC and can be processed in the coating process and stored partially cured. In this respect, the necessary process window for the coating is discontinuously investigated and determined depending on the preselected polymers. Subsequently, basic manufacturing processes are evaluated according to the fresh-on-fresh method:

1. Thermal activation: Crosslinking of the prepreg by hydration heat or thermal post-treatment
2. Chemical activation: Crosslinking of the prepreg by chemical compounds in fresh concrete, e.g. alkaline compounds.

Based on tests on textile and concrete composite specimens, the polymers and their processing methods will be given state-of-the-art suitability. For at least two suitable polymers, the procedures are scaled up to continuous processes. This takes place both at the level of the coating process and at the level of the component manufacturing process in the form of a functional sample. In the latter case, the effects of the limited shelf life and the transport of prepreps that may have to be cooled are considered.

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