Institut für Textiltechnik und Lehrstuhl für Textilmaschinenbau
RWTH AACHEN UNIVERSITY

Project title:	**development of biobased thermoplastic natural fibre prepregs - BioYarnCoat**
Partner:	APS GmbH
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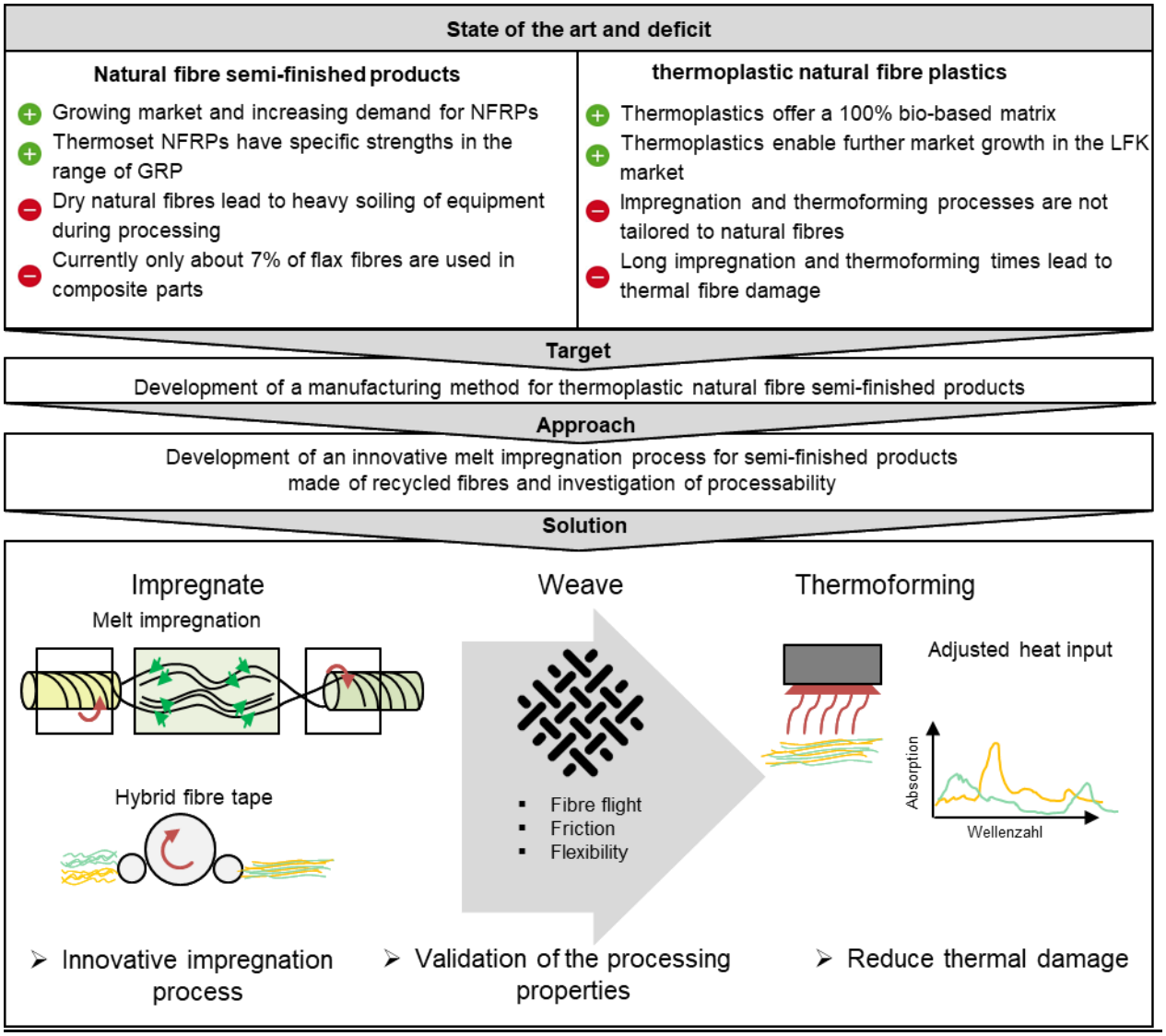
Mission Statement

In 2015, the member states of the United Nations unanimously adopted the 2030 Agenda. The containment of global warming continues to be of central importance. In the mobility sector, the focus is particularly on compliance with emission limits. The use of lightweight materials such as fibre-reinforced plastics (FRP) can make a decisive contribution here. From an ecological point of view, natural fibres are particularly suitable for reinforcing FRP. They have good specific mechanical properties, are locally available in Europe and have a neutral CO2 balance in cultivation. Even without including photosynthesis during cultivation, the CO2 balance for the production of natural fibres is approx. 80 % lower than for the production of glass fibres. In view of the comparable specific strength, natural fibre-reinforced plastics (NFK) are therefore increasingly being used as a sustainable alternative to glass fibre-reinforced plastics (GRP).

Approach

The aim of the BioYarnCoat project is to create the preconditions for the use of FRP with bio-based thermoplastic matrix systems in composite lightweight construction. For this purpose, an innovative melt impregnation process for the thermoplastic coating of yarns is being developed using flax fibre yarns and polyamide (PA) 11 as examples. The coating process is explicitly designed to reduce the thermal damage to the natural fibres. The coated yarns have an adjustable constant fibre volume content, are furthermore flexible and can therefore be processed into textile semi-finished products using common textile processes. The thermoplastic coating contributes to a reduction of fibre friction in the textile processing and thus to a lower incidence of fibre fly. Cleaning and maintenance intervals can thus be reduced. In contrast to fully consolidated organic sheets, the semi-finished reinforcements produced have a textile character, which enables comparable forming properties as with the use of thermoset prepregs. In addition, the semi-finished products can be cost-effectively processed into fully consolidated complex LFRP components by hot forming without any additional process steps. The performance potential of the natural fibres is thus fully transferred to the composite material,

which is why the project aims to achieve at least 90% of the specific tensile strength and tensile modulus of thermoplastic GRP.



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