GRASSE ZUR COMPOSITE TESTING

ITA Institut für Textiltechnik und Lehrstuhl für Textilmaschinenbau

RWTH AACHEN UNIVERSITY

Project title:	Development of an innovative clamping solution for the tensile testing of impregnated and non-impregnated reinforcement fibre rovings used for lightweight construction
Partner:	Grasse Zur Ingenieurgesellschaft mbH
Duration:	06/2020 – 05/2022
Funding Agency:	Central Innovation Program for Small and Medium Sized Enterprises (ZIM) of the Federal Ministry for Economic Affairs and Energy (BMWi)

Univ.-Prof.
Prof. h.c. (MGU)
Dr.-Ing. Dipl.-Wirt. Ing.
Thomas Gries
Director

Shantanu Bhat
Research Associate

Ref.: Bhat
08.06.2020

Mission Statement

Lightweight construction is achieved through the use of new lighter fibre composite materials, a load path and material-oriented design and by functional integration. Precise material characterization is of central importance for a material-oriented design. There are many different test specifications for determining the various characteristic values of fibre composite materials. A characteristic value that is often relevant for the design is the tensile strength of a material on the roving level. There are several different test specifications for determining the tensile strength on the roving level as shown in the main figure (Figure 1).

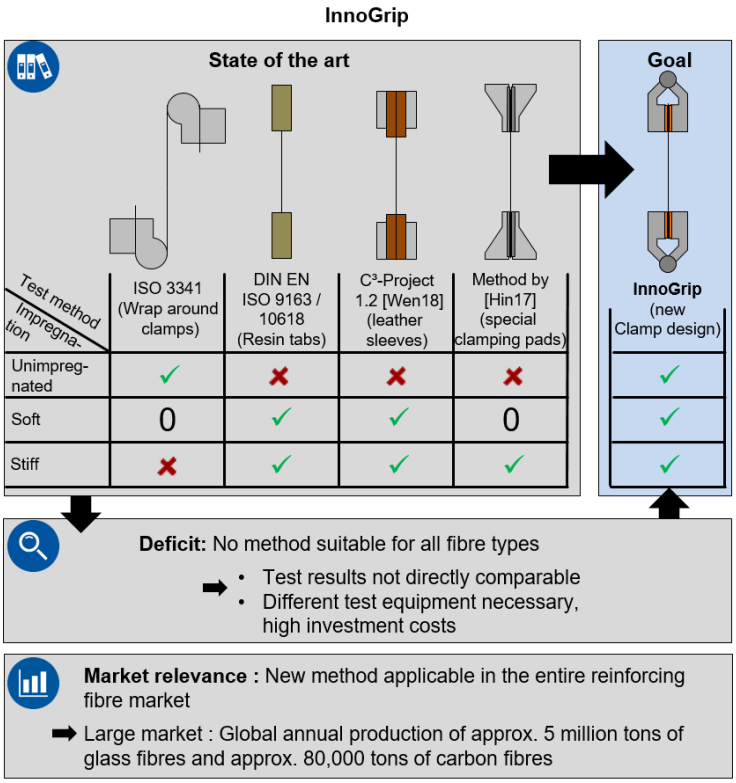

Figure 2: Main figure InnoGrip

Which method can be used depends on various factors, such as the fibre material or the impregnation state of the roving. At present, there is no testing method that is suitable for all types of reinforcement fibre rovings and different impregnation states, which leads to high investment and storage costs. In addition, the characteristic values determined with the various processes are not easily comparable with each other.
The aim of the project is to develop a single clamping solution that allows different types of reinforcement fibre rovings to be clamped and tested efficiently without damage. Therefore, an adaptive clamp with suitable clamping material and clamp geometry will be developed. Furthermore, based on this clamp, a test method is being developed that allows fast and efficient testing of reinforcement fibre rovings independent of the impregnation state or material (glass or carbon).

Approach

First of all, clamping concepts have to be defined and developed, which allow a simple and fast testing of reinforcing fibres in different forms and materials. Secondly, suitable textiles for test clamp development are selected. Next, a clamp for tensile testing of impregnated and non-impregnated reinforcement fibres is developed, designed and manufactured. The development process is supported by a simulation of the clamp-yarn interaction. In addition, a test procedure is developed that produces reliable, reproducible test results. Finally, the focus of the project is the validation of the clamp functionality and the test method through comparison with existing competitive testing techniques.

Acknowledgement

We would like to thank the Federal Ministry for Economic Affairs and Energy for funding the research project as part of the Central Innovation Program for Medium-Sized Enterprises.

Contact

Shantanu Bhat
Institut für Textiltechnik of RWTH Aachen University
Otto-Blumenthal-Str. 1
52074 Aachen
Tel.: +49/(0)241/80 247 41
Fax: +49/(0)241 80 224 22
shantanu.bhat@ita.rwth-aachen.de