



Polymer Composites

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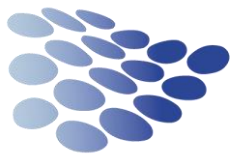
transverse strength workshop

New test approach to determine the transverse tensile strength of CFRP with regard to the size effect

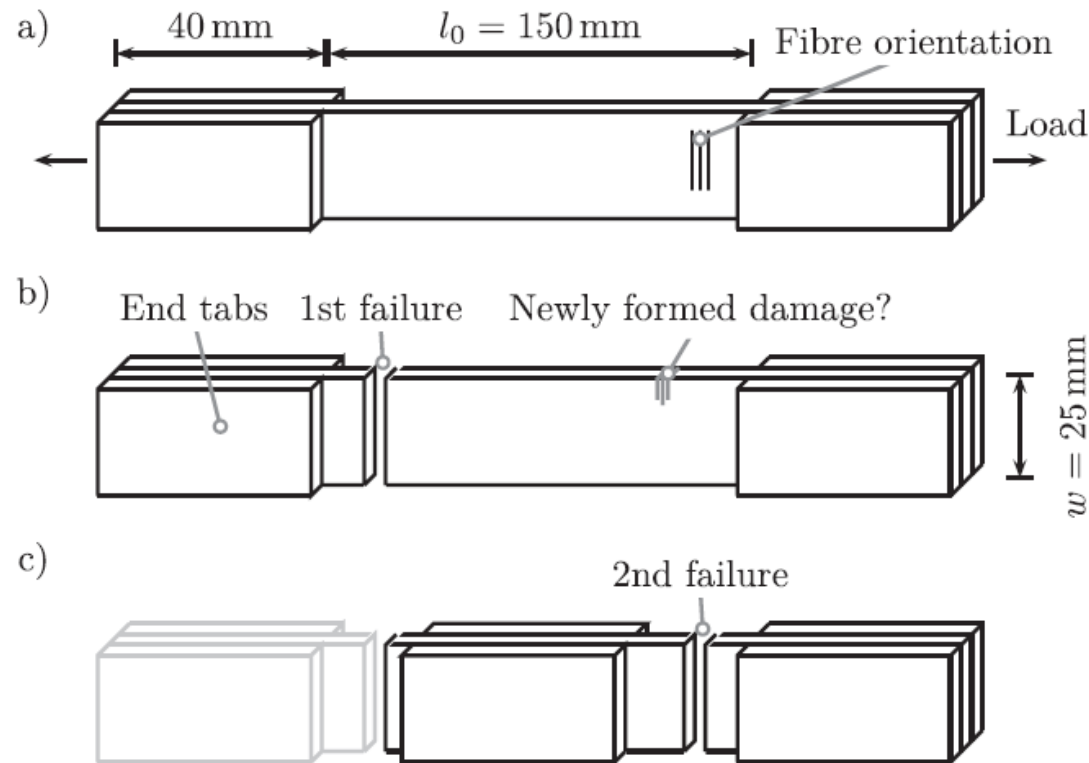
Bodo Fiedler

Hamburg University of Technology
Institute of Polymers and Composites

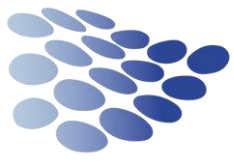
Online, October 20th 2022



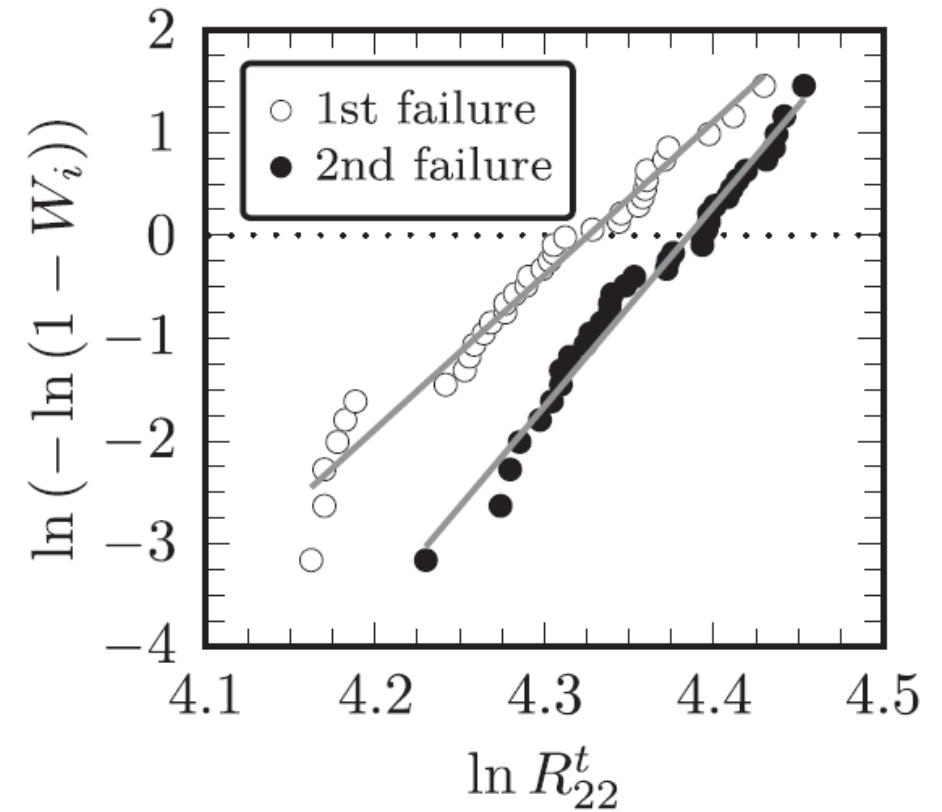
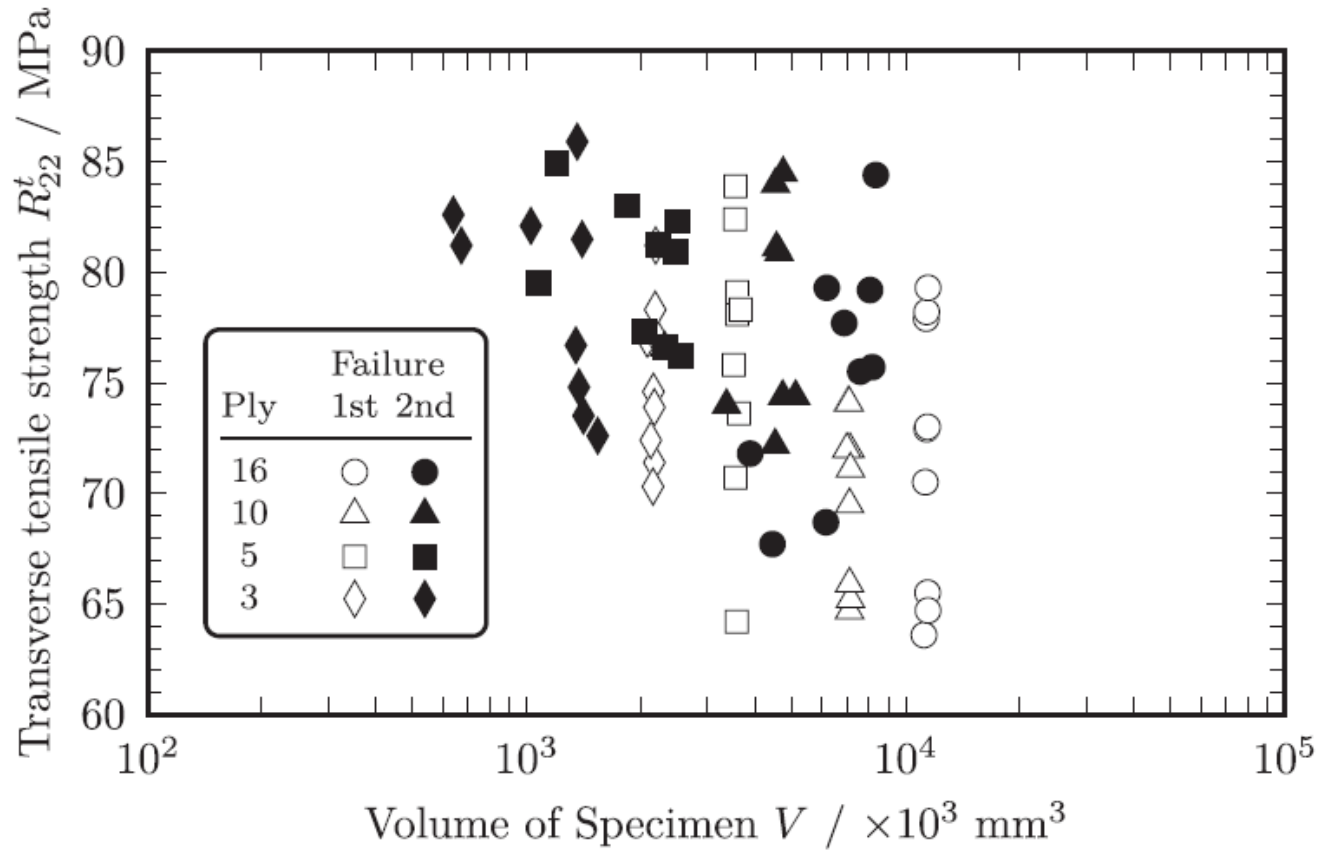
- Unidirectional prepreg material HexPly-M21/34%/UD194/T800S (Hexcel)
→ $[90]_n$, where n is $n = 3, 5, 10, 16$ (specimens thickness)
- Three plates of each configuration are produced in order to regard statistical variations of the manufacturing process within the test results.

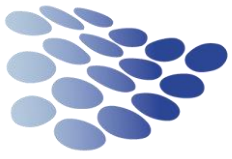


Transverse Tensile Strength R_{22}^T ?

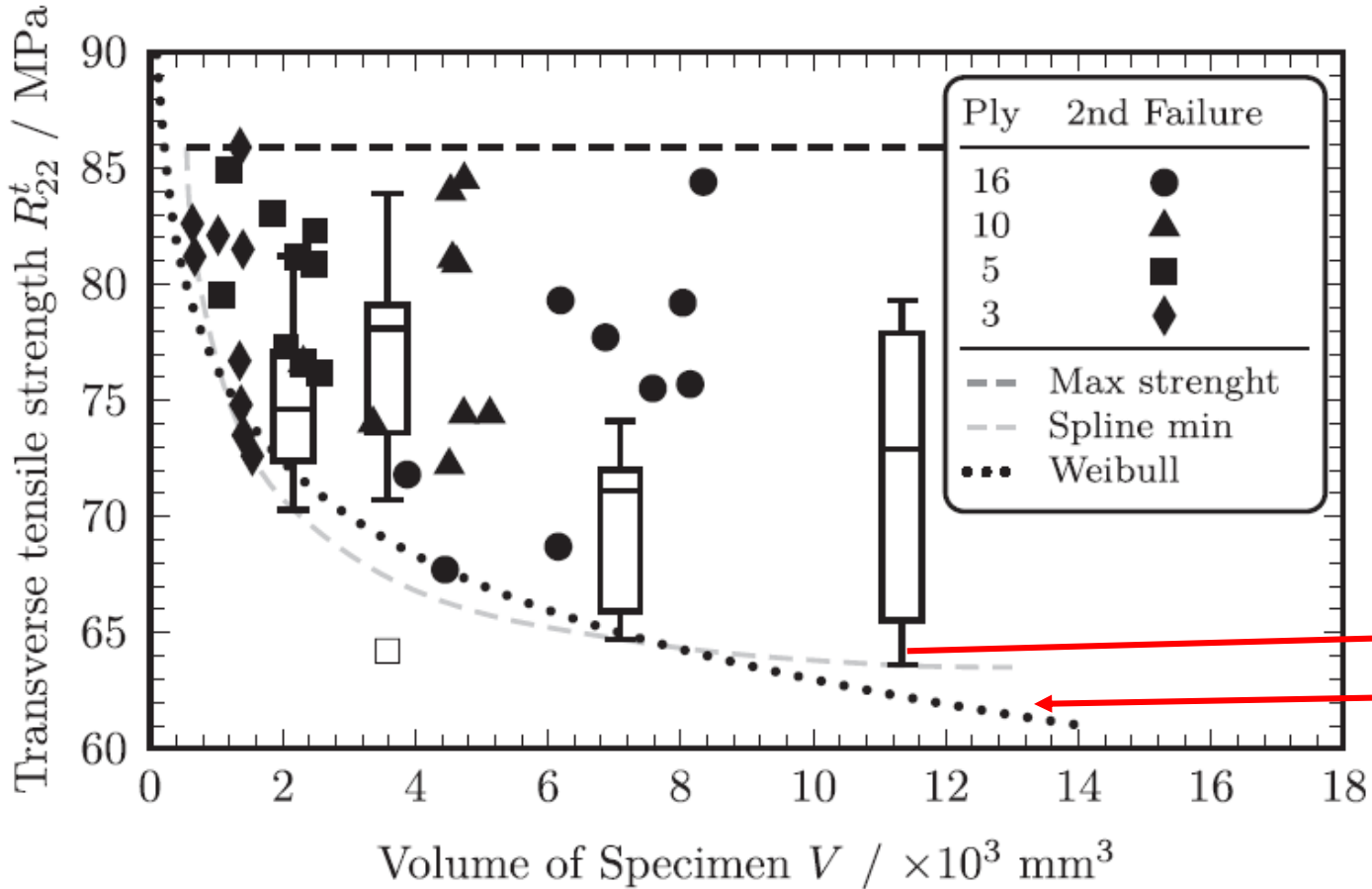


Transverse tensile strength versus specimen volume

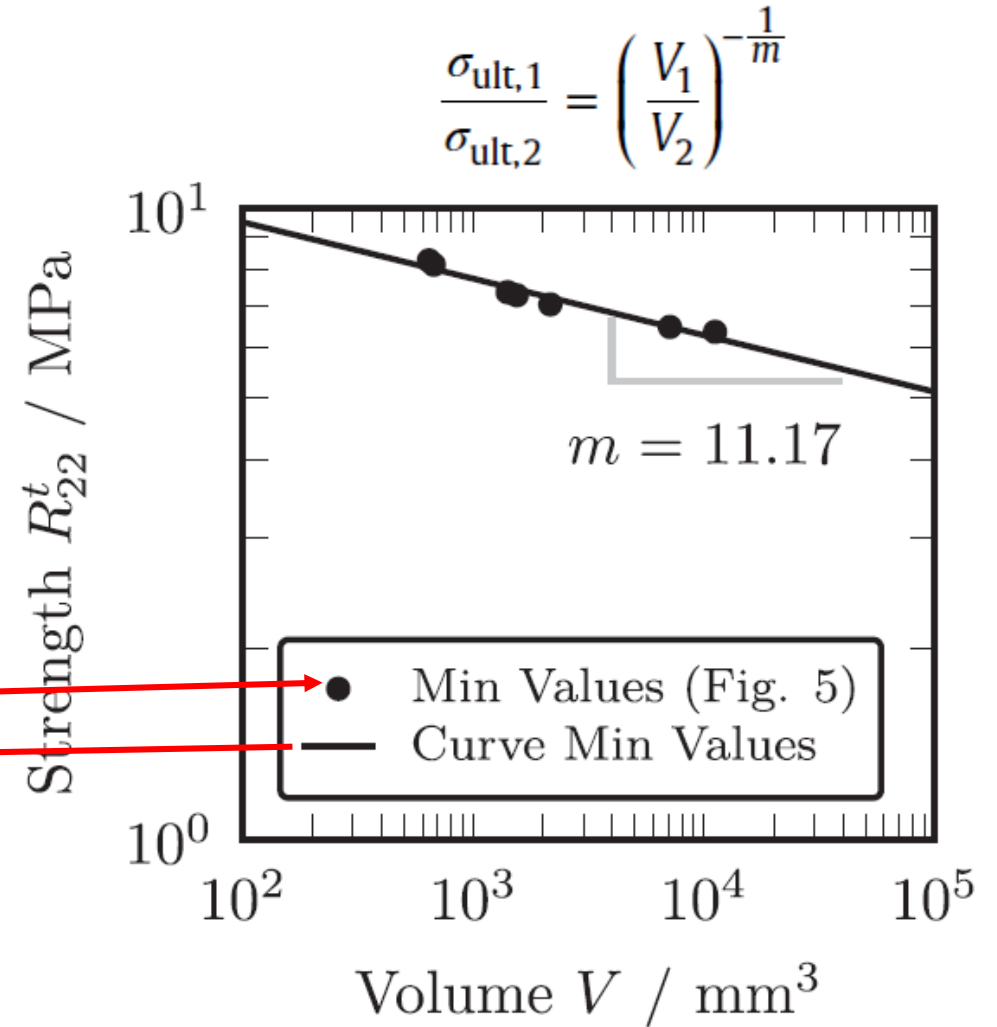


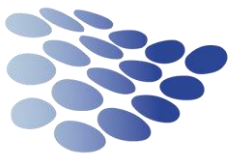


Transverse tensile strength versus specimen volume



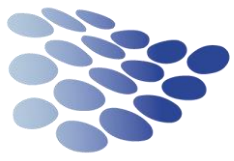
Weibull weak link scaling diagram





First transverse failure occurs at the most critical defect (weakest link) and second failure strength is higher than first failure strength.

The new method provides a more accurate measure of transverse tensile strength, which may be used along with Weibull scaling to predict transverse strength of smaller volumes e.g. 90° layers in cross-ply laminates during fatigue loading or micromechanical modelling.



Thank you for your attention!

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New test approach to determine the transverse tensile strength of CFRP with regard to the size effect



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