

## **Experimental Characterization of Fluid Influence on Transverse Compressibility Behaviour of Technical Textiles Through In-Situ-Impregnation Method**

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Transverse compaction behaviour of technical fabrics has been studied extensively in the scientific literature. Most experimental research was focused on the influence of fibre volume fraction, number of layers, loading speed or binder content. These aspects can be characterized on dry samples and thus, test-rigs were designed accordingly. Based on (a) the need for more extensive testing capabilities and (b) the results of an international benchmark exercise on textile compaction from 2021 [1], a novel test-rig was designed allowing for the characterization of dry and wet compressibility in a single experiment. For this purpose, in-situ impregnation of the samples under compressive load is realized in the experimental setup. This approach enables to reduce measurement time as well as measurement errors caused by fabric variability.

This paper introduces a novel test methodology for the measurement of textile characteristics at conditions equivalent to liquid composite moulding (LCM) techniques, through a test configuration of dry loading/dry relaxation/wet relaxation/wet unloading. Furthermore, the influence of different test fluids can be quantified. The work at hand utilizes the proposed novel test methodology to study the influence of different test fluids on a non-crimp-fabric (NCF) through comparison of characteristic stages of the relaxation process. The results of these measurements can be used to (a) improve existing material models of textile compaction behaviour and (b) predict the relaxation of fabrics relevant for LCM processes.

[1] Yong et al.: 'Experimental characterisation of textile compaction response: A benchmark exercise', *Composites Part A: Applied Science and Manufacturing*, Volume 142, 2021.  
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