

Single fibre testing – relation to variability

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ABSTRACT

Fibre testing of wood fibres is a difficult task, which not only is related to the small dimensions of wood fibres in general but related to their large variability and susceptibility to acquire damages during the isolation process. Thus in order to obtain reliable fibre testing data different strategies may apply; i.e. to test a considerable number of fibres obtaining average values, to fully characterise the full morphology of each fibre tested including its damaged areas, relating properties to these, to measure the influence of variables and relate properties to these. In this presentation the last strategy has been adopted. With the use of only relative measurements of fibre properties the set-up is in a way also more forgiving towards deficiencies in the testing arrangement. To some extent this relates to the difficulties in deformation measurements on this small scale; the relative effect being less affected.

In this presentation a set-up for tensile testing of single fibres in the range of 1 to 2 mm in length is presented. Fibres are mounted in the tensile testing device using a mechanical support in the arrangement of the clamps. The glue used has been found to be sufficiently strong, not to flow into the fibre to any appreciable extent and to be inert towards moisture. This ensures reliable fibre tests in the range of interest. The tests performed have preferably been creep tests [1], where different variables have been investigated. In particular it was noticed that the fibril angle had the outmost importance for the relative magnitude of the mechano-sorptive creep, being smaller the larger the fibril angle. Effects of moisture scanning on fibre properties are also presented and discussed in relation to fibre modelling [2]. This demonstrates the assets of coupling modelling to targeted fibre measurements for increased understanding of structural effects of the wood fibre wall.

References

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