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MANTIS, HVI AND SPINNING: SOME PRELIMINARY RESULTS

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Abstract

This study was conducted to gain a better understanding of the relationships between the different dynamometric measurements used to characterize fibers and yarns.

Fibers from 17 samples spanning a broad range of the principal technological criteria (Micronaire, length, strength, …) were characterized on the following instruments: High Volume Instrument (HVI), Mantis (single fiber strength) and Stelometer. Independent samples were then spun by ring spinning (25 tex) and open end spinning (25 tex) in our micro-spinning workshop before the yarn was subjected to dynamometric characterization.

In addition, a dedicated software solution was developed to simulate breakages in a flat web of fibers (like that analyzed by HVI) on the basis of force/elongation spectra in single fibers on the Mantis instrument. Thanks to this software it was possible to take into consideration the fiber crimp when gripped in the traction jaws, and thereby simulate different preparation quality levels in the specimens to be broken. Simulations were performed with different mean crimp values and different crimp variabilities.

The results of these simulations were used to predict the results of dynamometric measurements in fibers and yarns.

The simulations confirmed that the results of physical measurements (strength, elongation) are dependent to varying degrees on the crimp level, and thus regardless of the type of control instrument used to measure the fiber and yarn.

In addition, the Coefficient of Fiber Efficiency (CFE), i.e. the ratio between the force obtained on the web and the sum of the maximum forces on individual fibers, was affected by fiber crimp.

The correlations between CFE and fiber and yarn strength or elongation measurements indicated that increasing the crimp would not systematically result in a more accurate prediction of the characteristics measured.