fibra.stress

DIA-STRON
DELIVERING MEASUREMENT SOLUTIONS

Overview

fibra.stress is a high-precision, automated tensile tester combined with a dimensional analysis module. By measuring the cross-sectional dimensions of each fibre, tensile data can be normalised, reducing data variability and helping to discriminate subtle changes along the fibre length and between fibres. In-situ dimensional measurements can also be captured during testing, from which other material properties such as Poisson's ratio can be calculated. fibra.stress supports a wide range of fibre types/gauge lengths, and multiple tensile methods including stress relaxation, creep and hysteresis.

Principal features and benefits

- Combined dimensional and tensile testing in one workflow
- Standalone operation and automated sample handling option
- Testing compatible with ISO 11566, JIS R 7601 and ASTM c1557 standards
- Unique sample preparation method for easy and repeatable sample mounting

Applications

- Single fibre tensile strength study with compliance correction
- Diameter distribution of single filaments
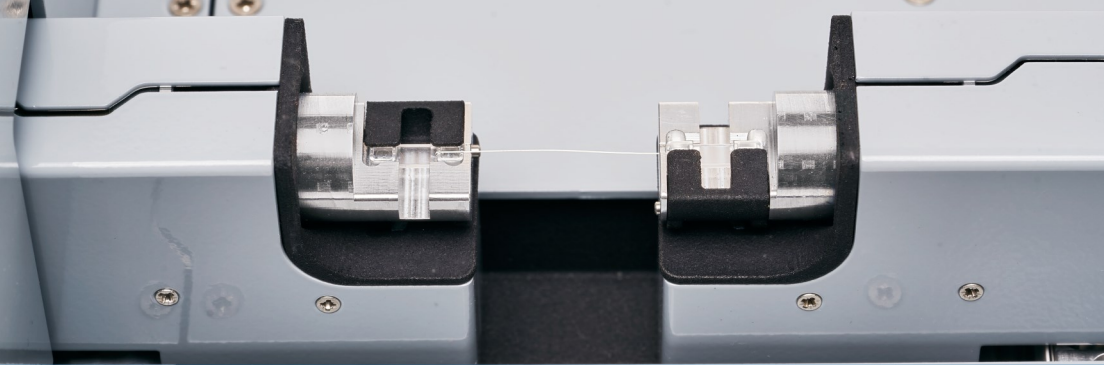
Metrology principle

fibra.stress combines a high resolution extensometer with a laser scanning micrometer (LSM) for simultaneous tensile and dimensional measurements.

Prepared single fibre samples are loaded into two sample pockets, one set at a fixed position, attached to a load cell, and one that moves during the measurement. The fixed pocket can be automatically adjusted relative to the moving pocket prior to the test, so that various sample gauge lengths can be accommodated (4, 10, 12, 20, 25, 30 and 40mm).

During dimensional measurements, the aligned pockets rotate synchronously, with the sample located centrally in the laser beam, obtaining the minimum and maximum diameters to calculate a cross-sectional area. The sample can be measured at a single point, in rotation, or scanned along its length in discrete 'slices'.

Integrating the extensometer with the LSM guarantees alignment between the fibre and the laser beam, ensuring accurate measurements. The addition of automated sample handling on the fibra.auto platform allows for automated measurements of up to 250 samples without user intervention, for higher testing throughput and reliability.

Dedicated software – fibra.

The fibra.stress system is controlled using Dia-Stron fibra. software. Through fibra., multiple test methods can be run on the system, including extension to break, stress-relaxation, creep and hysteresis. The software includes a number of built-in analysis methods, as well as automatic data correction for compliance in line with ISO and ASTM standards. Raw data can also be exported as a text file, for use in Excel or other statistical packages, or as a HDF5 file (Hierarchical Data Format), standard format for managing scientific data .

fibra. is compatible with the latest versions of the Windows OS.

Sample data
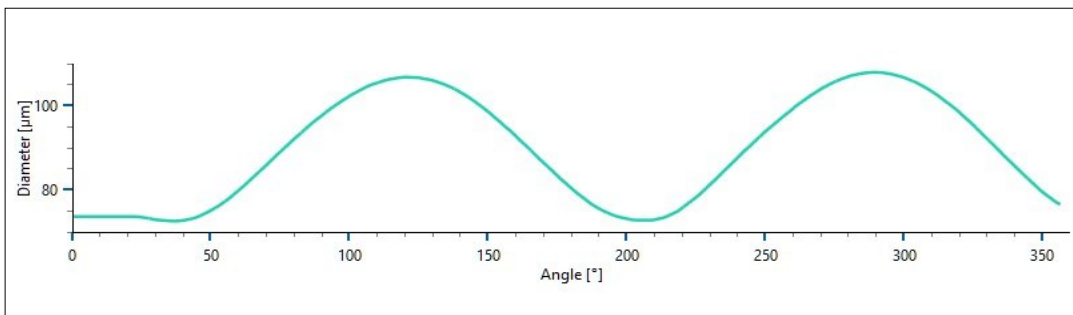
Diameter measurement of a single hair fibre taken on fibra.stress
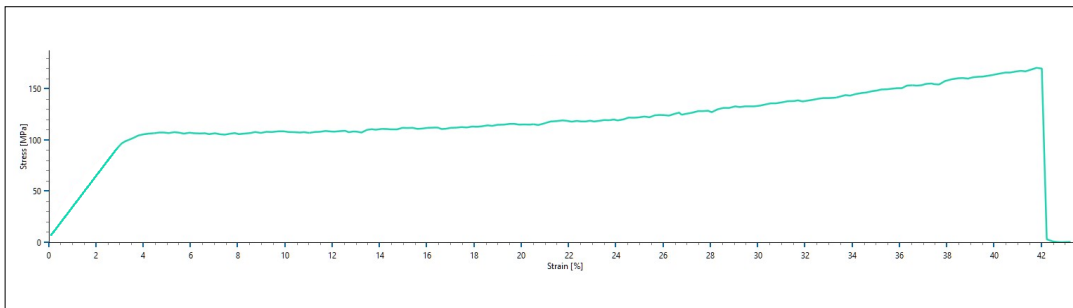
Stress-strain curve of a single hair fibre taken on fibra.stress

Linear Extensometer	
Linear movement	50mm
Linear rate	0.001 to 3mm/sec
Load cell force capacity	20N, 2.5N also available
Force resolution	0.0005N or 0.5mN/ 0.05gf (20N load cell)
Displacement resolution	0.1µm
Displacement accuracy	±0.1µm
Laser Scanning Micrometer	
Diameter range	5 to 2,000µm
Resolution	0.01µm
Repeatability	±0.03µm
Translation resolution	4µm
Rotation resolution	0.2°
Scan rate	3200scans/sec
Specimen gauge lengths	4, 10, 12, 20, 25, 30 and 40mm
Specifications	
fibra.stress	410 x 232 x 126mm 6.2kg
Mitutoyo LSM control unit	335 x 277 x 134mm 5kg

Contents

fibra.stress
Mitutoyo LSM control unit
Mains power block
Ethernet cable
USB to Ethernet adaptor
LSM6200 RS232 cable
LSM6200 Laser cable
Regional power adaptor (if applicable)

Requirements	
Power Supply	85-265V AC 47-63Hz, 50W
Computer	Windows OS: 10 and 11 1 x USB 3.0 port or Ethernet port

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