DIA-STRON
DELIVERING MEASUREMENT SOLUTIONS

# Interfacial Shear Strength (IFSS) Module

Overview

The Interfacial Shear Strength module (IFSS) is an interchangeable module for the Dia-Stron LEX820, used to measure the debonding force of micro-droplets on single fibres and filaments. The camera and light source enable users to visualise the fibre/droplet during the test and capture the mode of failure in video and still images. The IFSS method can be applied to various fibre and filament types: glass, carbon, ceramic, aramid, basalt or natural fibres.

Principal features and benefits:
- Detailed interfacial shear data
- Image calibration and droplet measurements
- High speed video and image capture via USB connection
- High positional repeatability and accurate speed control
- Adjustable magnification (10 - 220x) and built-in polarisation

Applications:
- Interfacial shear strength properties
- Visualise and record mode of failure at the fibre/matrix interface
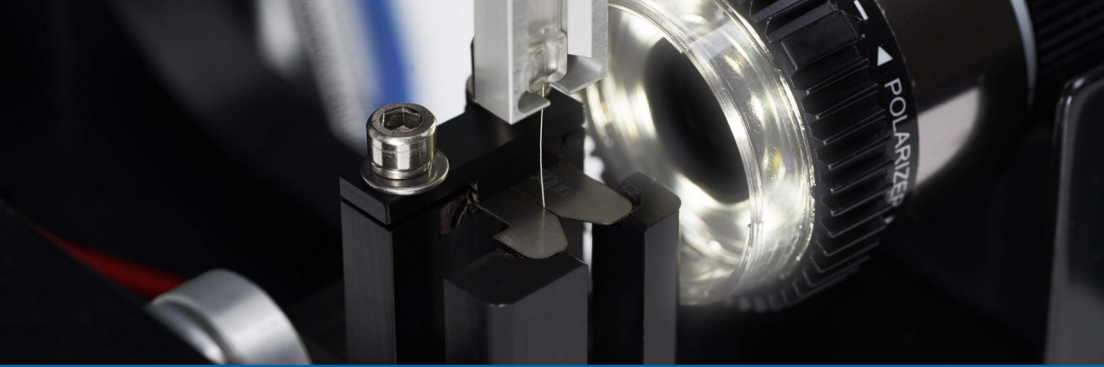
Metrology principle

The IFSS measurement is based on the universally recognised micro-bond method, which evaluates the interfacial properties of matrix resins on fibres and filaments commonly used in composite materials.

The IFSS module uses interchangeable precision laser cut tungsten slotted plates to support the micro-droplet whilst the specimen is withdrawn through. The sample is secured at the other end using the Dia-Stron one-part plastic tab system and held in place using pneumatic sample covers. The force being applied by the micro-droplet* to the plate is recorded by the load cell until interfacial failure.

The camera and light source enable capture of high speed images of the fibre and droplet, with the built-in polarisation filter suppressing glare from reflective materials such as metals, plastics and glass. The illumination system provides front and back lighting. The droplet location and size can be measured on captured images, and dynamic shearing behaviour can be recorded to identify the type of failure mode.

*Samples are mounted using the Dia-Stron one-part plastic tab system. Please note: it is the responsibility of the user to apply micro-droplets using thermoplastics or thermosets on the fibre when using the IFSS module.

Dedicated software – UvWin

The LEX820 system is controlled using Dia-Stron UvWin software. Method parameters can be easily edited within the software, and UvWin enables automatic data correction for system compliance.

UvWin also offers a number of integrated data processing tools and the raw data can be exported as a text file, for use in Excel or other statistical packages. UvWin is compatible with the latest versions of the Windows OS.

Sample image and data
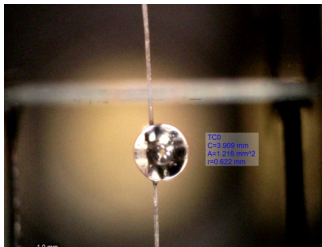
Sisal fibre with an epoxy resin droplet
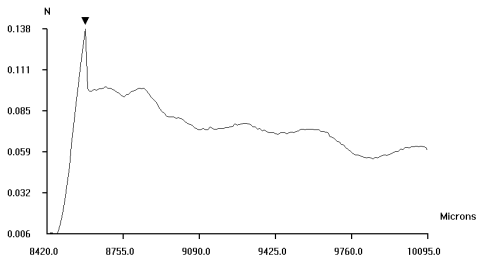
Debonding data for a polypropylene droplet from a Lyocell fibre

LEX820 Linear Extensometer	
Extension range	3—53mm
Speed range	0.01 to 2.6mm/sec
Force range	0 to 2.5N or 0 to 20N
Force resolution	0.05mN (2.5N) or 0.5mN (20N)
Displacement resolution	1μm
Displacement accuracy	50μm
Load cell linearity	±0.1% full scale
Shearing plates	
Standard shearing plate slot sizes	50μm, 80μm, 100μm, 200μm
Content	
LEX820 Instrument IFSS Module, including camera and illumination system UV1000 Control Unit PU1100 Pneumatic Unit UvWin software for Windows OS	
Requirements	
Power Supply	85-265V AC 47-63Hz, 100W
Compressed Air	Dry and clean 4.5 Bar 20 l/min
Computer	Windows OS: 7 and 10 2 x USB 2.0 ports 1 x USB 3.0 port
Imaging	
Illumination	White light, front (polarised) and back
Camera	5 megapixel CMOS sensor 10 — 220x magnification Maximum frame rate 45fps Built-in polarisation

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