CYC802 Cyclic Module

Overview

The CYC802 Cyclic Tester simulates a realistic approach to everyday hair grooming by subjecting fibres to repeated cyclic tensile deformations until failure. Data analysis from the CYC802 shows greater differences between samples than conventional tensile stress/strain experiments.

Principal benefits:
- High throughput testing
- High capacity: 50 sample linear cassette and up to 4 cassettes in a cassette hotel
- Automated operations and analysis
- Up to 4 cyclic modules can be integrated on an automated platform
- Multi-tasking allows for simultaneous measurement, reducing resting time

Applications and claims:
- Fatigue testing using repeated strain, force or stress
- Hair root vs tip survival analysis
- Impact of hair treatments
- S-N curves

Metrology principle —

The CYC802 fatigue tester is designed around a voice-coil drive which repeatedly brings the sample to a pre-determined strain, force or stress. The sample is mounted using Dia-Stron brass crimps and placed within two sample pockets. With the fibre dimensions already captured, the CYC802 brings the sample to a pre-set force before starting the fatigue measurement. Various factors contributing to fibre failure are: presence and propagation rate of flaws depending on ethnicity, chemical or physical damage, grooming regime and environmental factors such as UV exposure.

Dedicated software – UvWin

The CYC802 system is controlled using Dia-Stron UvWin software. Parameters for these methods can be easily edited within the software. 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 data and analysis —
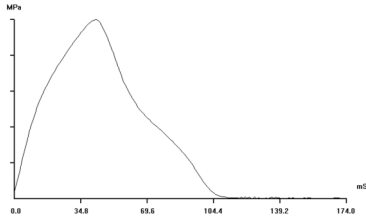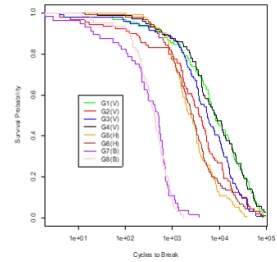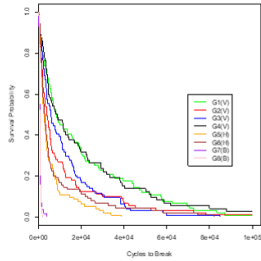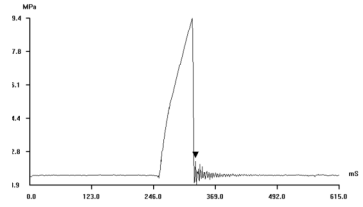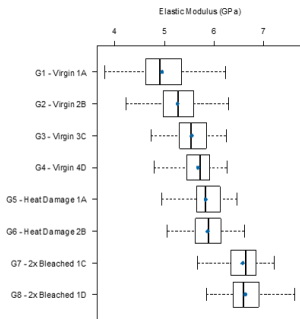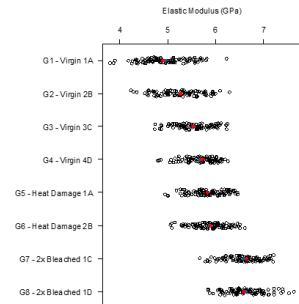
Figure 1: First cycle

Figure 2: Failure cycle

Kaplan-Meier plot using a linear x-axis (left) and a logarithmic x-axis (right)

Boxplots of elastic moduli
Blue dots represent means

Scatterplots of elastic moduli
Blue dots represent means
Red dots represent medians

References —

Publications:

Marsh JM., Mamak M., Wireko F., Lebron A., Cambron T., Huber T., David IN., Williams REA. and McComb DW. (2018): "Multimodal Evidence of Mesostructured Calcium Fatty Acid Deposits in Human Hair & Their Role on Hair Properties"; ResearchGate, September 2019

Everaert EPJM., Zhang S., Tran D., Kroon B., Zhang G., Thompson B. and McMullen RL. (2015): "Strengthening the Hair Fiber from Within: Repairing the Cortex of Damaged Hair"; IFSCC Conference, Zurich 2015

Evans TA. (2009): "Fatigue testing of hair—A statistical approach to hair breakage"; Journal of Cosmetic Science, 2009, 60, 599-616

Examples of use in patent claims:

US20170007518A1 Method of strengthening hair fibers and protecting dyed hair color from fading or wash-out (Ashland) May 2019

Uses for claims in technology advertising:

- Ashland
- Evonik

CYC802 Module	
Extension range	28-50mm
Speed range	1-100mm/sec
Force range	0 to 20N (2000gmf)
Force resolution	0.05gmf
Displacement resolution	10μm
Dimensions (LxWxH)	445x20x130mm
Weight	2.25kg
Programmable Features	
Methods	Constant force Constant strain Constant stress S-N curve
Content	
UV1000 PU1100 CYC802 module USB and power cables UvWin software for Windows OS	
Requirements	
Power supply	Universal 85-265V AC 47-63Hz, 100W
Computer	Windows OS: 7 and 10 1 x USB port

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