



FCS

FIBRE CLASSIFYING SYSTEM





FCS – Fibre Classifying System

For every spinning mill, precise information on the raw material properties are absolutely essential. Tests on all significant parameters serve to check the incoming fibre quality, to organize the bale stock, to select matching bales for mixing, and to define the settings of all machines along the complete production chain (cards, drafting frames, spinning machines, etc.). Thus, reliable and high-grade laboratory equipment helps to optimize the yarn quality and to improve the productivity – and thereby the profit.

To comply with this challenge, Textechno designed the FCS to measure all fibre properties which determine the quality and the spinnability of both, cotton and man-made fibres, used in production of spun yarns.

FCS is a modular system consisting of individual stations. Either in form of fibres or slivers and rovings, it is suitable to test all types of short- and long-staple fibres (up to 190 mm). Results include fineness values, fibre length properties, fibre-bundle strength, whiteness/yellowness degree, as well as a sophisticated analysis of impurities.

To verify the fibre quality, the recommendations of international quality standards (USDA) are applied by the FCS software, which also includes the assessment of spinnability to optimize the spinning process.

All above mentioned parameters are measured as absolute (not relative) numbers (“direct mode”). This enables the FCS to produce meaningful results on synthetic fibres and blends. Even for cotton, no calibration cotton is needed. If desired, the system can still be calibrated with calibration cotton to match High-Volume Instrument results (relative measurement).

List of parameters measured by FCS

Tester	Parameter	Related to number(n)/ weight(w) of fibres	Symbol	Suited for			Property	Combination of FCS stations
				Cotton	Man-made	Long-staple		
FIBROTEST	Bundle strength, relative (HVI)		HVI-STR	●		●	Tensile	BALEXPERT
	Bundle strength, absolute		STR	●	●	●		
	Elongation		Elo	●	●	●		
	Uniformity index	w	UI	●				
	Uniformity ratio	w	UR	●				
	Span length (short staple) at 2,5%	w	SL2.5	●	●			
	Span length (short staple) at 25%	w	SL25	●	●			
	Span length (short staple) at 50%	w	SL50	●	●			
	Tuft (long staple) at 2,5%	w	TL2.5		●	●		
	Tuft (long staple) at 25%	w	TL25		●	●		
	Tuft (long staple) at 50%	w	TL50		●	●		
	Length at 1%	n/w	L1		●	●		
	Short-fibre index (short staple)	w	SFI	●				
	Spinning consistency index		SCI	●				
	Fibre-quality index		FQI	●				
Count-strength product		CSP	●					
MDTA 4	Length at 5%	n/w	L5		●	●	Length	BALEXPERT
	Upper half mean length	w	UHML	●	●			
	Mean length	n/w	ML	●	●			
	CV of mean length	n/w	CV		●	●		
	Upper quartile length	w	UQL	●	●			
	Short-fibre content	n/w	SFC	●		●		
	Length at 25%	n/w	L25			●		
	Cleanability, cleaning efficiency		CE	●	●			
	Opening energy		OE		●			
	Stickiness		ST	●				
OPTOTEST	Dust content		Dust	●	●		Trash	SPINEXPERT
	Fibre fragments		FF	●	●			
	Non-lint content		NLC	●	●			
	Number of neps		NpCnt/g	●	●	●		
	Number of seed-coat neps		ScnCnt/g	●	●	●		
	Number of trash particles		TrCnt/g	●	●	●		
	Trash area		TrArea	●	●			
	Trash count		TrCnt	●	●			
	Leaf grade		LG	●	●			
	Whiteness		Rd	●	●			
FIBROFLOW	Yellowness		+b	●	●		Colour	BALEXPERT
	Colour grade		CG	●	●			
	Micronaire value		MIC	●	●	●		
	Maturity value		MA	●				
	Maturity ratio		MR	●				
FIBROFLOW	Linear density		LD	●	●		Micronaire	BALEXPERT



FIBROTEST

Serving as the main station of the FCS, the FIBROTEST incorporates both, fibre length measurement and fibre-bundle strength test within one instrument. The two measurements are executed in succession on the same sample. As final step of the fibre-bundle strength test the sample mass is automatically determined. This enables to calculate the exact and absolute value of the tenacity.

The FIBROTEST is the first testing instrument worldwide which has received the ITMF recognition (see itmf.org). The ITMF ICCTM hence recognizes the usefulness and benefits of the FIBROTEST for spinning mills and research institutes.





FIBROFLOW

This station is designed to measure micronaire and maturity of cotton according to international standards, such as ASTM-D1448 or ISO 10306. Maturity value, maturity ratio, and linear density are not calculated, but are actually measured by means of the two-compression method. The FIBROFLOW station includes the micronaire tester and a high-precision balance.



OPTOTEST

This station determines the color (Rd, +b) of fiber material as well as the trash content according to ASTM-D5867 for High Volume Testing devices. Additionally, also the color grade, leaf grade and the Cie-Lab color data (L^* , a^* and b^*) are tested. OPTOTEST is supplied with a set of HVI calibration tiles, manufactured by USDA. In combination with MDTA 4 and Neps- and Trash-Digital Analysis (NT-DA, included in the OPTOTEST software), the percentage and quantity of impurities can be measured. For further details please refer to the description of NT-DA functionality on page 6.

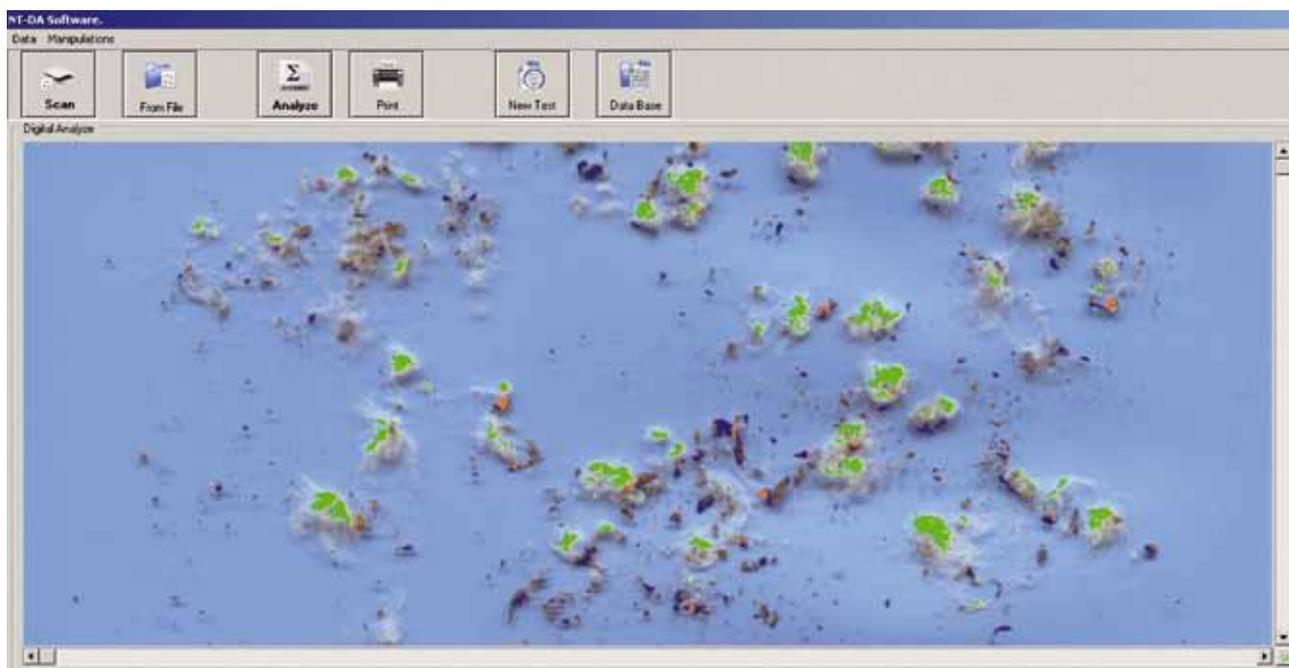


Image-processing on impurities

NT-DA

Utilizing digital image-processing software, the NT-DA (Neps and Trash-Digital Analysis) analyses a high-resolution picture of the impurities separated from the cotton fibres by the MDTA 4.

Impurities are automatically classified into neps, seed coat neps and trash parts, and into three size classes, i.e. > 0,5 mm, > 0,75 mm and > 1,0 mm.

Within these size classes the number of impurities is counted and reported as neps/g, seed-coat neps/g and trash parts/g.

As a cost-effective alternative, i.e. if no color measurement is required, the trash analysis can be carried out using a high-resolution scanning system instead of the sophisticated OPTOTEST.

MDTA 4

The Micro-Dust and Trash Analyser MDTA 4 is a modular tester consisting of the basic unit, the optional fibre length module and the optional rotor ring unit. The basic unit separates the clean cotton from all impurities, which by an integrated filter system are separated into dust content, fibre fragments, and remaining impurities such as neps, seed-coat neps and trash particles. From the weight of these impurity classes the non-lint percentage is determined.

With an additional NT-DA or OPTOTEST, the separated impurities are classified according to their size and number as neps, seed-coat neps and trash particles.

Digital image processing is used in the optional fibre length module to carry out measurements on individual fibres, assuring accurate length values and a precise determination of the short fibre content in absolute numbers.

If equipped with the optional rotor ring unit, the clean fibres are collected to form a ring-shaped sliver of 1 m circumference. This rotor allows assessing the number of sticky points. When opened, this sliver can be spun into an OE-yarn.

During opening, the energy required to open the sample to single fibres is recorded to determine the



opening behavior. This opening work is an essential parameter for the carding process – depending on the setting of the MDTA 4 it is indicative of the fibre-to-fibre or the fibre-to-metal friction.

MDTA 4 allows measurements of cotton and man-made fibres in different sample forms, such as raw cotton from the bale, tufts before carding, as well as carding- and draw-frame slivers. Thus, the instrument can be used to analyse the cleaning efficiency of the back process and carding machines.



BALEXPERT

BALEXPERT

Commonly, so-called “HVI” testers are used to measure standard fibre parameters.

Textechno offers the BALEXPERT to match the results of such high-volume testers and add many useful additional parameters. For a full list refer to the table on page 3. The BALEXPERT consists of the FCS stations **FIBROTEST**, **OPTOTEST** and **FIBROFLOW**.

Two more exiting functions have been included to allow organizing a complete spinning mill with the BALEXPERT:

Bale management function

Based on the test results of the BALEXPERT, the bale management software allows to organize matching bales into groups and provides

proposals to combine bales from the storage to produce a yarn of the desired properties. Hence, BALEXPERT can be used to manage the complete bale storage.

Mixing function

This function is used to predict the final yarn properties of a blend of different fibre lots and/or fibre materials, based on the test results of the FCS stations.

Another task is to virtually change the blend percentage of different lots/fibres, so that the resulting blend matches with the requirements of the production machines, e.g. to determine the desired fibre length UHML suitable for a given draw-frame.



SPINEXPERT

In addition to the BALEXPERT combination of FCS stations used to measure all important parameters for cotton trading/ginning, the SPINEXPERT combination of FCS stations provides all test results necessary to technologically assess the fibre spinnability.

The SPINEXPERT consist of the FCS stations **MDTA 4**, **FIBROFLOW** and **OPTOTEST/NT-DA**.

An extraordinary feature is the very detailed analysis of the non-lint content. First, the impurities are separated from the fibre sample by means of the MDTA 4.

Thus, these impurities can be visually inspected and compared to the test results, which guarantees plausibility.

Subsequently, these impurities are analysed by means of a digital image processing. For a detailed list of measured parameters refer to the table on page 3.

As the first system worldwide, the SPINEXPERT measures the non-lint content of raw cotton, the cleaning degree of the carding machines, and classifies/counts the impurities into several classes/sizes.

General remarks

All stations of the FCS can be flexibly combined in all possible configurations, depending on the test results requested.

The test frequency of a BALEXPART combination of FCS stations strongly depends on the selected test parameters, which are extremely flexible. On the FIBROTEST, the test speed for both, the fibre length and the tensile strength, can be set from 10 up to 300 mm/min. Using the recommended testing speed of 100 mm/min, the BALEXPART reaches 40-60 tests per hour.

Due to the opening process of the sample, tests with a SPINEXPART are naturally slower and reach approx. 10-15 tests per hour. However, the sample size of 5-10 g leads to an outstanding confidence level. In addition, the SPINEXPART includes an extremely precise trash analysis.

In this way, the flexibility of the FCS in combination with the above mentioned sample throughput makes the FCS a well-suited testing system, which is interesting for small- and medium-sized spinning companies, too. Finally, due to the high-precision measurements, the FCS is also a perfect tool for institutes and research laboratories.



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