International Committee on Cotton Testing Methods (ICCTM)

Progress Report 2024

Proceedings of the Meeting of the ITMF-International Committee on Cotton Testing Methods (ICCTM)

Monday, March 18th, 2024, 13:00-16:30 hrs. (CET)
Tuesday, March 19th, 2024, 09:00-12:30hrs. (CET)

At the Bremen Cotton Exchange, Bremen, Germany
& virtual attendants from abroad

Chair:	Axel Drieling, Faserinstitut Bremen e.V. (FIBRE), Germany
Vice Chair:	Mona Qaud, Uster Technologies AG, Uster, Switzerland
Secretariat:	Christian Schindler, ITMF, Zürich, Switzerland

Preface

The International Textile Manufacturers Federation (ITMF, www.itmf.org), founded in 1904, is an international association for the world's textile industries, dedicated to keeping its world-wide membership constantly informed through surveys, studies and publications and through the organisation of annual conferences, participating in the evolution of the industries basic raw materials and their application, through specialised committees, with the overall objective of creating growth and prosperity in all aspects of industry.

The International Committee on Cotton Testing Methods (ICCTM) is a non-profit technical subcommittee of ITMF. The main function of the Committee is to encourage research and development for enhanced cotton testing methods, to recognize suitable test methods and instruments, to identify reference test methods, to harmonize cotton testing results and to discuss testing related problems.

The mandates of the Committee are:

1. Encourage research into the basic science needed to develop commercially useful tests.
2. Encourage the development of enhanced testing methods.
3. Recognition of instruments and testing methods that are beneficial for the cotton value added chain, being able to perform within allowable tolerances, and achieving results that correlate with a reference method.
4. Identification of reference methods.
5. Harmonize cotton testing methods and results by means of
    a. proposition and support for the international standardization of test methods
    b. development of guidelines for testing
    c. technical evaluations using world-wide round tests.
6. Discussion of problems related to testing of cotton fibre properties and their relations to cotton processing.

Introduction

Dr. Christian Schindler, Director General of the ITMF, welcomed the members and observers of the ITMF International Committee on Cotton Testing Methods (ICCTM) in Bremen, which started as a hybrid meeting, and took place ahead of the start of the International Cotton Conference Bremen. About 40 persons from different international locations and representing different institutions attended the meeting. He thanked the Bremen Cotton Exchange for accommodating the meeting.

Axel Drieling, Chairman of the ICCTM, presented the agenda of the meeting including future topics and areas of activities, especially regarding the topic recycling.

Interested parties are always welcome to ask for membership at the ITMF ICCTM Committee by sending an email to secretariat@itmf.org. Members have access to the ITMF-ICCTM-Website, which allows the members of the Committee to find all relevant documents, including all presentations of this meeting.

Executive Committee

it was agreed to include the separate Steering Committee into the existing Executive Committee as a single entity – respective changes in the Statues were discussed. An overview of the proposed modifications was given on Monday and the changes were approved with one abstention on Tuesday.

Since 2012, no specific tasks are listed anymore, but a joint Executive Committee is looking after all relevant topics. The ICCTM Executive Committee consists now of the following persons (including all changes from the 2024 Committee meeting):

- Mr. Axel Drieling (Chairman)
  Faserinstitut Bremen e.V. (FIBRE), Germany,
  contact: drieling@faserinstitut.de
  (Focus: HVI; Stickiness starting 2024)
- Mrs. Mona Qaud (Vice Chair)
  Uster Technologies, Uster, Switzerland,
  contact: mona.qaud@uster.com
  (Focus: Length/Strength)
- Dr. Stuart Gordon
  CSIRO, Waurn Ponds, Geelong, Australia,
  contact: stuart.gordon@csiro.au
  (Focus: Fineness / Maturity)
- Dr. Marinus van der Sluijs
  TTS, Geelong, Australia,
  contact: sluijs@optusnet.com.au
  (Focus: Spinnability)
- Ms. Gretchen Deatherage
  USDA AMS, Memphis, USA
  contact: gretchen.deatherage@usda.gov
  (Focus: Neps/trash)
- Justin Kühn
  ITA Aachen, Germany
  contact: justin.kuehn@ita-aachen.de
  (Focus: Recycling)
- Dr. Jean-Paul Gourlot
  CIRAD, Montpellier, France,
  announced his retirement at this meeting
  (Focus: Stickiness)

- Dr. Terry Townsend (Coordinator of the Steering Committee)
  Cotton Analytics, USA,
  contact: terry@cottonanalytics.com
- Mr. Darryl Earnest USDA-AMS, Memphis, USA
- Mr. Karsten Fröse Bremer Baumwollbörse, Germany
- Jens Wirth Bremer Baumwollbörse, Germany
  wirth@baumwollboerse.de

During the meeting, Felix Liebhold from Textechno, Germany, and Justin Kühn from ITA Aachen, Germany, were asked if they would like to participate in the future in the Executive Committee's active work. Justin Kühn confirmed his willingness to participate. He was unanimously elected by the Committee with one abstention.

	Documents	**Topic**
1	Committee	Modified ITMF ICCTM Statutes 2024

Updates by Machinery Manufacturers & Institutes

Axel Drieling invited the present instrument manufacturers to share their updates or developments. Representatives from Uster Technologies, Textechno, and MAG Solvics provided updates on their instrumentation:

- Uster Technologies: Continuous improvements of existing equipment, especially worth mentioning is the Automated Micronaire measurement in classing institutions, e.g. at USDA and ABRAPA.
- Textechno: Showed their ongoing work for fiber testing, and especially developments on the MDTA4 for testing recycled fibers.
- MAG Solvics: Mr. Anbarasan referred to the presentation where they would present HVI developments.

In addition, the Chairs asked representatives from the research institutes for their inputs. Here ITA Aachen, Cotton Research Institute in Egypt and CSIRO in Australia shared their ongoing projects.

- Institute for Textile Technology, ITA Aachen, Germany: Justin Kuhn from the ITA Aachen discussed his research on moisture management, mechanical and chemical recycling, and the challenges of recycling fibers.
- Cotton Research Institute, Egypt: Dr. Mohammed Negm from the Cotton Research institute in Egypt highlighted their work on testing Egyptian Cotton varieties and their focus on quality through extensive sample testing.
- CSIRO, Australia: CSIRO in Australia shared their focus on breeding programs and the closure of their post-harvest research laboratory, emphasizing their shift to production and breeding work.
- Faserinstitut Bremen (FIBRE) is putting its current focus on textile recycling and recycled fibers.

Instrument recognition

Axel Drieling summarized the instruments that have been recognized to date:

- Textechno: Fibrotest: Length and Strength
- Mesdan: Aqualab: Moisture
- Cotton Scope: Fiber Fineness

- Mesdan: Contest S-: Cotton Stickiness
- Premier Aqura: Fiber Neps & Length

Branca had explained its ongoing interest in the recognition process for their regain tester prior to the meeting, despite delays due to the pandemic.

Asked for the benefits of the recognition, Stefan Fliescher from Textechno mentioned that the effort has been high to fulfill all necessary documentation, however it is difficult to estimate the concrete benefit of having it, bringing it to the customers.

Guidelines: Testing Guideline and Result Interpretation Guideline

The ITMF International Committee on Cotton Testing Methods (ICCTM) and the ICAC Committee on Commercial Standardization of Instrument Testing of Cotton (CSITC) jointly published the "Guideline for Instrument Testing of Cotton" with its first version in 2012, and the current version 3 in 2018. The latest version is always available on the CSITC-website, the ITMF-website, and the ICAC-website. Now René van der Sluijs collected changes for a new version, which will be published after the meeting.

In addition, both committees published the Guideline "Interpretation and Use of Instrument Measured Cotton Characteristics" (Interpretation Guideline) with its version 1 in 2020 (available at the same sources). Some propositions for changes were asked by Textechno (amendments) and Uster Technologies: Also, the new charts of USP (Uster Statistics Percentile) 2023 need to be adapted. On the second day of the meeting, Mona presented the modifications in the Interpretation Guideline, with this changing from version 1 to version 2.

One missing topic in the Interpretation Guideline is the variation of properties between bales within a lot. For this, Mona presented some formerly published results. She mentioned that the committee is looking for volunteers for filing this information suitably. Axel mentioned that there are several topics that could be added rather than only editing the given content.

	Presentations	
	Author	**Topic**
2	Mona Qaud, Uster	HVI result variation within and between bales

ASTM Standard for Instrument Qualification

Axel and Gretchen discussed the status of the ASTM D7410 standard for the qualification of High-Volume Instruments. Both highlighted the importance of this Standard for the annual verification of the instrument and its testing. Gretchen explained that the approval of ASTM D7410 standard lapsed due to the pandemic but reassured that efforts are underway to reinstate it.

HVI High Volume Instruments: Coordinator: Axel Drieling (FIBRE, Germany)

	Presentations	
	Author	**Topic**
3	MAG- Solvics Mr. Anbarasan	Novel Automation Features in High Volume Cotton Testing

Mr. Anbarasan presented the development of the high-volume tester Genius 2, highlighting features such as automatic sample feeding, micronaire testing and an air reservoir for

uninterrupted testing. He also emphasized the design improvements aimed at minimizing operator handling and movement, enhancing testing efficiency and accuracy.

Neps/ Trash: Coordinator: Gretchen Deatherage (USDA-ARS, USA)

	Presentations	
	Author	**Topic**
4	Axel Drieling, FIBRE	Comparison of Trash measurement – Round trial results

Axel Drieling presented a study of different trash methods, that included gravimetrical trash measurements such as Shirley, MDTA3, MDTA4 and optical measurements, and how they correlate. Correlations were better when similar methods (like all gravimetric methods) were compared than between different methods.

Gravimetric trash measurements were included in Bremen round trials since 2022 with samples from multiple regions. Key findings from the round trial results up to now were:

- Gravimetric methods correlate strongly with each other (R^2 0.98).
- High Volume Instrument results (video-based) correlate much less with gravimetric methods (R^2 0.75).
- MDTA instruments measure trash + dust + fiber fragments; add only 0.1–0.3% extra.
- Slope ≈ 0.95 → MDTA results ~5% lower than simple gravimetric testers
- AFIS correlation to gravimetric methods is better than to High Volume Instruments.

Issues from the discussion:

- “Trash” term may be misleading sometimes (as few cases it may include neps, seed coat fragments).
- Different reporting formats (single vs. multiple values) confuse participants.
- Sample size and operator handling affect accuracy.
- Gravimetric methods fit well together; optical methods differ fundamentally.

Currently the gravimetric trash methods are in the Round Trial reports divided into two groups: Simple gravimetric testers (Shirley, G Trash, Aqua Trash) and instruments that divide up into trash and dust and fibre fragments. It was discussed if the combination in one report would be beneficial or create more confusion.

Stickiness: Coordinator: Dr. Jean-Paul Gourlot (CIRAD, France)

	Presentations	
	Author	**Topic**
5	CIRAD, Dr. J-P Gourlot	Novel Automation Features in High Volume Cotton Testing

- Jean-Paul Gourlot of CIRAD presented the current state of stickiness testing, including the results of international round tests, the need for standardization, and the potential for using reference materials to calibrate results. He also announced his resignation and the transfer of responsibilities to FIBRE
- Current State: Jean Paul discussed the current state of stickiness testing, including the results of international round tests and the need for standardization. He emphasized the importance to correlate stickiness testing results with Stickiness in Practice (SIP), which is visible when spinning cotton practically. CIRAD conducted intense work on this topic.
- Reference Materials: He highlighted the potential for using reference materials to calibrate stickiness testing results, aiming for better reproducibility and accuracy. This material is from this month on available at FIBRE instead of CIRAD.

- Round Trials: FIBRE and / Bremen Cotton Exchange (BBB) will continue offering Stickiness Round Trials like done from 2017 on, with the next one in 2024/25 – still free of charge. For later Rond Trials, probably a fee for participation might be necessary.
- Resignation Announcement: Jean Paul announced his resignation and the transfer of responsibilities to FIBRE and the Bremen Cotton Exchange (BBB).
- FIBRE and BBB explained their willingness to continue and intensify the work on stickiness, offering reference service to the cotton community.

Fineness / Maturity: Coordinator: Dr. Stuart Gordon (CSIRO, Australia)

	Presentations	
	Author	**Topic**
6	Dr. Stuart Gordon, CSIRO, AUS	Overview of cotton fiber maturity

In his presentation. Stuart Gordon provided an overview of the current status of cotton fibre maturity and fineness measurement techniques. He noted current test instruments and standardized testing protocols. Additionally, the presentation highlights the dearth of publications on new test methodologies for fibre maturity and fineness over the last five years. The presentation also provided a brief report on Australian research and development of an algorithm for predicting Micronaire in real-world field conditions. Lastly, it explores the recent application of cotton test methods to bast fibres, such as industrial hemp, exemplifying the potential adaptability of cotton measurement techniques across various fibres.

Spinnability: Coordinator: Dr. Marinus (René) van der Sluijs) (TTS, Australia)

	Presentations	
	Author	**Topic**
-	Dr. Marinus van der Sluijs, TTS, AUS	Demands from spinning to cotton testing
8	Theresa Ritter, Uster Technologies	Uster Statistics 2023 on fibers & processes

Marinus (René) van der Sluijs held a presentation with considerations about yarn manufacturing and especially the according raw material issues. He mentioned that short staple plants can easily switched from processing cotton to MMF yarns.

Theresa Ritter highlighted how to obtain data for yarns with recycled content and discussed applying USTER® STATISTICS to assess overall fiber quality and process steps up to roving, including HVI and AFIS results.

As the aim of testing cotton finally is to produce good yarn quality, the spinnability topic will be continued.

Recycling: Coordinated by René van der Sluijs)

	Presentations	
	Author	**Topic**
9	Textechno, Dr. Guntram Kugler	Nep measurement on MDTA4

Guntram Kugler summarized the approach and findings of Textechno on testing of recycled fibers.

- Currently there are no given recommendations which parameters to test.
- At Textechno, there instruments are used/provided:
    - Length/strength with Fibrotest / Fibrolength
    - Remaining yarn pieces and neps with MDTA 4 and NTDA module
    - Fineness with Fibroflow
    - Fibrocolor for fiber color
- Nep amount and size are getting more important for spinners as well as for recycled fiber manufacturers.
- Textechno NTDA module consists of a high-resolution scanner plus specifically develop image analysis, analysing the trash box content of the MDTA 4.
- Neps are divided up into small (0.5 to 0.75 mm), medium (0.75 to 1 mm) and large neps (>1 mm)

Stefan Baz reported the experience with the Textechno instruments at DITF in Denkendorf, Germany. Currently there are different views on how to measure e.g. yarn pieces, especially how far to open or keep the yarn pieces during measurement.

Axel Drieling concluded that it is important to define the properties and parameters to be measured, trying to standardize it. These are important future topics for the ICCTM.

Traceability

It is agreed that traceability is an important topic and should be covered by the ICCTM. Currently a coordinator is not given. An according concept has to be developed.

Other topics

Guntram Kugler mentioned that it will be important to bring the topics of the ICCTM to the ginners as well as to the spinners.

Based on the topic areas, Guntram Kugler suggested to rename ICCTM in ICFTM – as we should cover not only cotton as a testing method, but also other fiber materials, and include natural and man-made fibers as well. Rene van der Sluijs mentioned that the current members are all cotton specialists, so we need to be careful. As a consensus, a strategy for the ICCTM Committee has to be developed, including the direction of ITMF.

Closing

Based on the decision of the full Committee, the Executive Committee and the Steering Committee will now be embedded into one Executive Committee. It is aimed to assign specific topics to individual Executive Committee members, but an assignment is not mandatory.

Recycling and Traceability will continue to be topics in this committee. So currently topic areas are:

- HVI
- Length/strength
- Fineness/maturity
- Neps/trash
- Stickiness

- Spinnability
- Recycling
- Traceability

We also need to replace colleagues on this committee who are retiring in the near future. Jean Paul Gourlot is planning to retire in the next two years, as are Karsten Fröse, Darryl Earnest and Guntram Kugler. We need to bring in new and young people from the textile industry to this Committee.

The next meeting is planned during the International Cotton Conference Bremen week. Planned is the meeting for March 23/24, 2026, again in Bremen in the building of the Bremen Cotton Exchange.

Dr. Christian Schindler closed the meeting and thanked all participants - online and on site - for the numerous contributions, fruitful discussions, and excellent presentations.

The Executive Committee and its Chairpersons will be happy to see all interested people in Bremen, Germany, in March 2026.

Dr. Schindler thanked the Chairpersons, Axel Drieling and Mona Qaud, for the preparation and organisation of the meeting and the Task Force Coordinators for their support.

Axel Drieling Mona Qaud
Chairman Vice Chairwoman

List of documents and presentations

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8	Theresa Ritter, Uster Technologies	Uster Statistics 2023 on fibers & processes
9	Textechno, Dr. Guntram Kugler	Nep measurement on MDTA4

Participants – onsite

- Christian Schindler, ITMF, Zurich, Switzerland, christian.schindler@itmf.org
- Axel Drieling, FIBRE, Germany, drieling@faserinstitut.de
- Mona Qaud, Uster Technologies, Switzerland, Mona.qaud@uster.com
- René van der Sluijs, Textile Technical Services, Australia, renevandersluis@gmail.com
- Jens Wirth, BBB, Germany, wirth@baumwollboerse.de
- Theresa Ritter, Uster Technologies, Switzerland, Theresa.ritter@uster.com
- Kanwar Usman, ICAC, USA, usman@icac.org
- Justin Kühn, ITA RWTH Aachen, Germany, Justin.kuehn@ita.rwth-aachen.de
- Felix Liebhold, Textechno, Germany, f.liebhold@textechno.com
- Guntram Kugler, Textechno, Germany, g.kugler@textechno.com
- Stefan Fliescher, Textechno, Germany, s.fliescher@textechno.com
- Jean Paul Gourlot, CIRAD, France, Jean-paul.gourlot@cirad.fr (retired)
- Michel Giner, CIRAD, France, Michel.giner@cirad.fr
- Matanya Zuntz, Israel Cotton Board, Israel, Matanya@cotton.co.il
- Karsten Fröse, BBB, Germany, froese@baumwollboerse.de
- Gretchen Deatherage, USDA, USA, Gretchen.deatherage@usda.gov
- Eric Trachtenberg, ICAC, USA, eric@icac.org
- Robert Jiang, ICA, UK, robert@ica-ttd.org
- Peyman Dehkordi, Uster Technologies, USA, Peyman.dehkordi@uster.com
- Neha Kothari, Cotton Incorporated, USA,
- Terry Townsend, USA, Ttownsend46@hotmail.com
- Gaetan Vogel, Decathlon, France, Gaetan.vogel@decathlon.com
- Stefan Baz, DITF, Germany, Stefan.baz@ditf.de
- Marius Möller, FIBRE, Germany, mmoeller@faserinstitut.de
- Olivier Zieschank, ITMF, Switzerland, Olivier.zieschank@itmf.org
- Darryl Earnest, Earnest Consulting Services, USA, Darryl.earnest@gmail.com
- Jonn Foulk, USDA ARS, USA, Jonn.foulk@usda.com
- Derek Whitelock, USDA-ARS, USA, Derek.whitelock@usda.gov
- Mohamed Negm, Cotton Research Institute, Egypt, Mohamed.negm@arc.scr.eg
- Suzan Sanad, Cotton Research Institute, Egypt, Suzansanad37@yahoo.com
- Chris Turner, Texas Tech University, USA, Christopher.turner@ttu.edu
- Jaya Shankar Tumuluru, USDA-ARS, USA, Jayashankar.tumuluru@usda.gov
- Md Abu Sayeed, Texas Tech University, USA, a.sayeed@ttu.edu
- Jim Olvey, American Pima Seed, USA, OANDA999@aol.com
- Bruno Bachelier, CIRAD, France, Bruno.bachelier@cirad.fr

Participants – remote

- Stuart Gordon, CSIRO, Australia
- Müge Ekizoglu, Izmir Ticaret Borsasi, Ege University, Türkiye
- M. Anbarasan, MAG, India
- Volkan Seyok, Karsu, Türkiye

INTERNATIONAL TEXTILE MANUFACTURERS FEDERATION
FEDERATION INTERNATIONALE DES INDUSTRIES TEXTILES
INTERNATIONALE VEREINIGUNG DER TEXTILINDUSTRIE

International Committee on Cotton Testing Methods (ICCTM)

Statutes

(adopted in Bremen in March 2024)

1. Constitution and Functions of the Committee

The International Committee on Cotton Testing Methods (ICCTM) is a non-profit Technical Subcommittee of ITMF (International Textile Manufacturers Federation).

The main function of the ICCTM is:

- To encourage research into the basic science needed to develop commercially useful tests.
- To encourage the development of enhanced testing methods.
- To recognize instruments and testing methods that are beneficial for the cotton value added chain, being able to perform within allowable tolerances, and achieving results that correlate with a reference method.
- To identify suitable reference methods.
- To harmonize cotton testing results by means of
    - proposition and support for the international standardization of test methods
    - development of guidelines for testing
    - technical evaluations using world-wide round tests.
- To discuss problems related to testing of cotton fiber properties and their relations to cotton processing.

The work of the ICCTM is organised and supported by its Executive Committee. These comprise the Committee Chairperson and Vice-Chairperson, the Executives and the Secretariat. The members of the Executive Committee are either coordinating their defined Task Force or are nominated for providing general input from cotton production to spinning.

The Secretariat is provided by ITMF, represented at the Committee by its Director General.

The ICCTM holds a General Assembly every two years in Bremen in conjunction with the International Cotton Conference Bremen, and its Executive Committee meet at least once during the intervening year. The Secretariat is responsible for organising the biennial General Assembly in co-operation with the Bremen Fibre Institute and the Bremen Cotton Exchange. The Proceedings of the General Assembly are documented by and published by ITMF.

Members and Chairmen are acting and working on an honorary basis.

2. Membership

The membership of the Committee consists of invited experts in cotton fibre testing and from research institutions drawn from all sectors of the industry from cotton production, including harvesting, ginning and trade, through cotton fibre and textile processing, including machinery manufacturers as well as testing instrument manufacturers.

Invitation of new members is made by the Executive Committee, and is ratified by the ICCTM members at the next General Assembly. Generally, members will come from ITMF member countries, but experts from non-member countries also may be invited to participate. It is the interest of ITMF and the ICCTM to include all interested parties and experts.

All members can propose new members, either for an individual meeting or for all future work to the Committee Chairman or to the Secretariat. Nominations should be made well in advance of the next General Assembly.

Membership will be reviewed at each General Assembly in order to determine the active membership.

For a resolution to be passed by the General Assembly or by an individual Task Force a majority of at least three-quarters of those members present is required.

The general policy of the ICCTM has always been that it should be open to new members, provided that the new members are prepared to become involved in the practical work of the ICCTM.

3. Election of Executive Committee Members

Election of the ICCTM Chairperson and the Vice-Chairperson and Executives shall be by all members present at a General Assembly.

The nominations shall be made by members of the ICCTM.

The Chairpersons and Executives shall be elected for two years and are eligible for re-election.

Termination of office is a consequence of termination of Committee membership or by the above-described election procedure.

4. Guidelines and Recommendations

Guidelines and recommendations of the ICCTM shall be ratified by the whole membership present at the General Assembly (at least three quarters majority in each case).

USTER® *HVI 1000*

The fiber classification and analysis system

Within bale variation of cottons

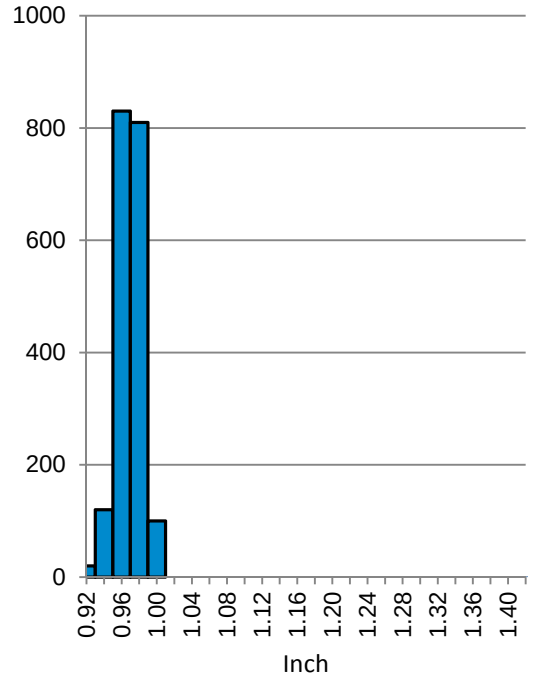
Mona Qaud, March, 2014

USTER®
Think quality

HVI variations within bales

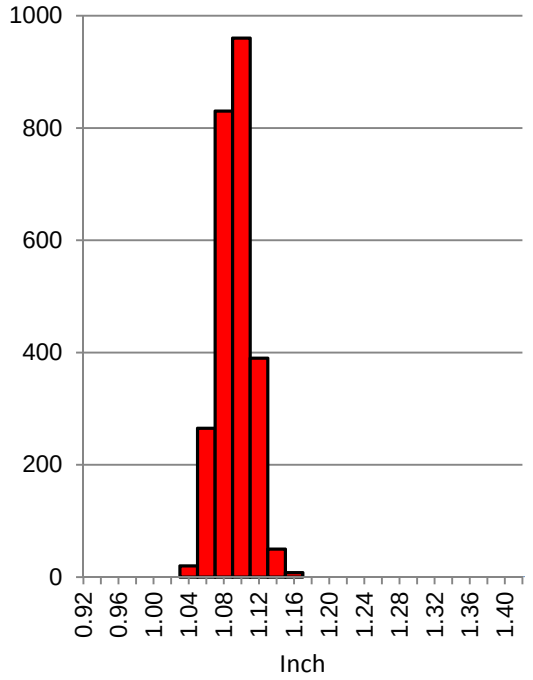
Histogram of fiber length values

USA MOT Cotton



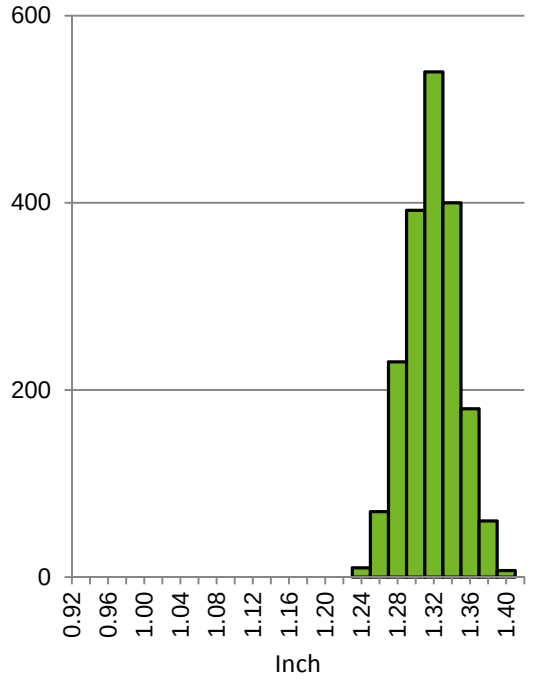
Conclusion

Mali Cotton



Conclusion

USA Pima Cotton



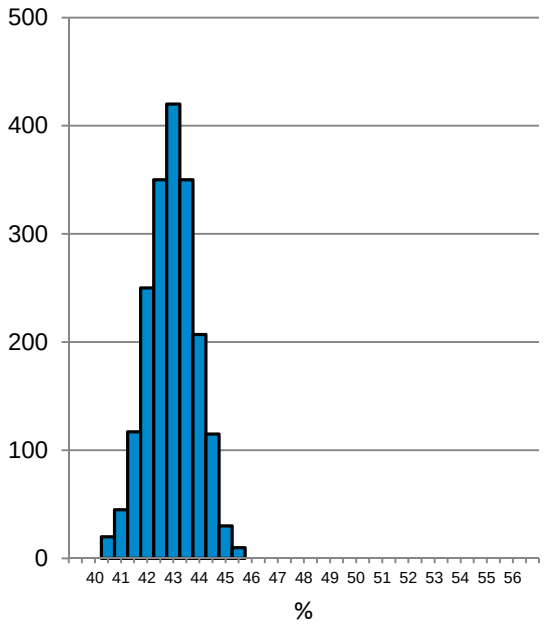
Conclusion

USTER® Think quality

HVI variations within bales

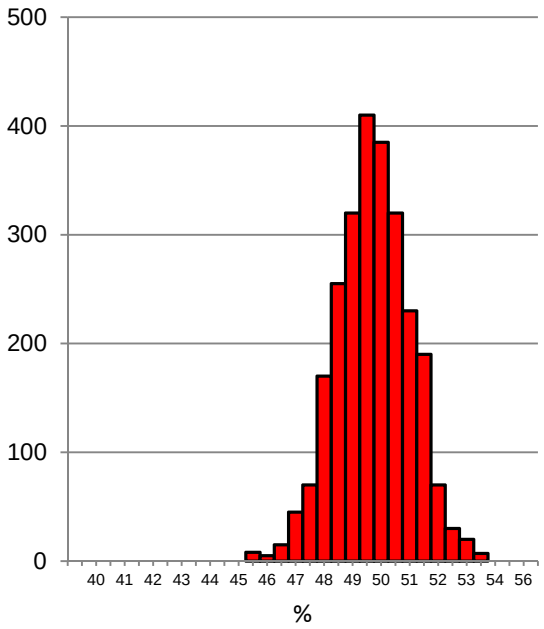
Histogram of Uniformity

USA MOT Cotton



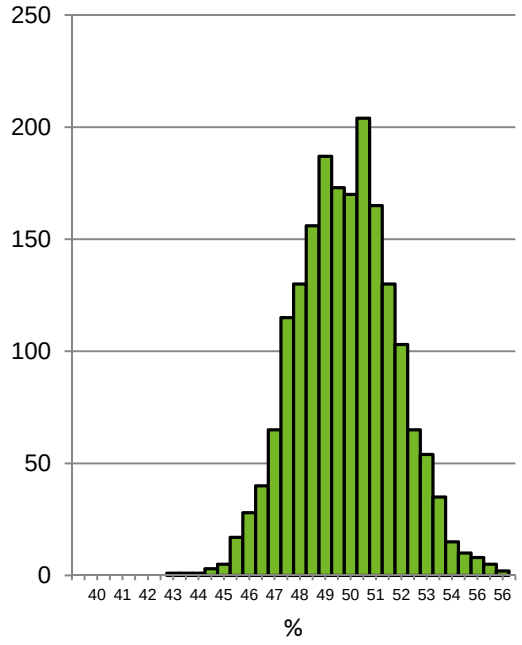
Conclusion

Mali Cotton



Conclusion

USA Pima Cotton



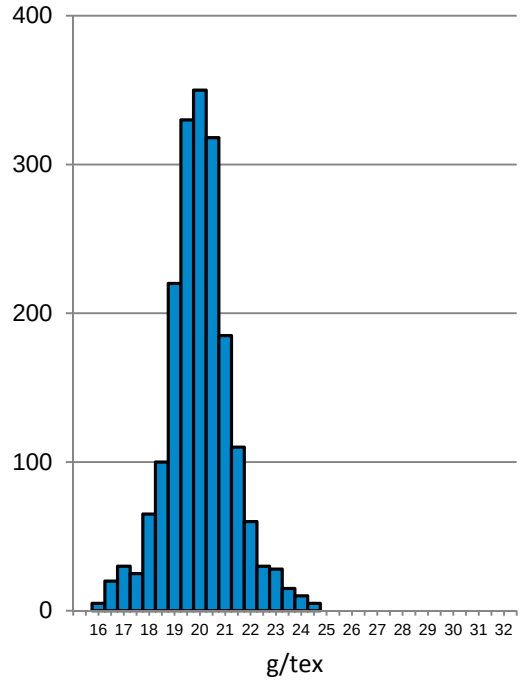
Conclusion

USTER® Think quality

HVI variations within bales

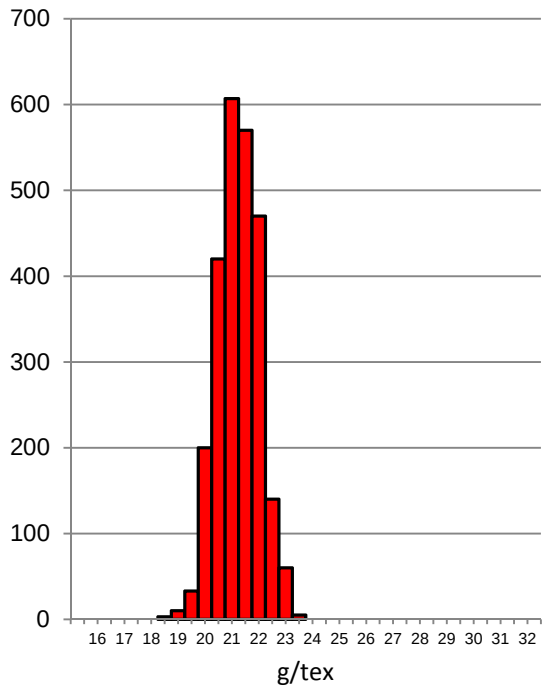
Histogram of fiber strength

USA MOT Cotton



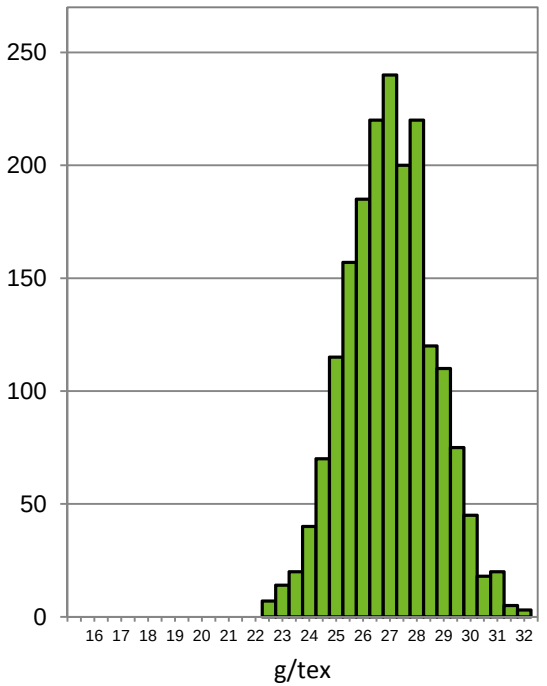
Conclusion

Mali Cotton



Conclusion

US Pima Cotton



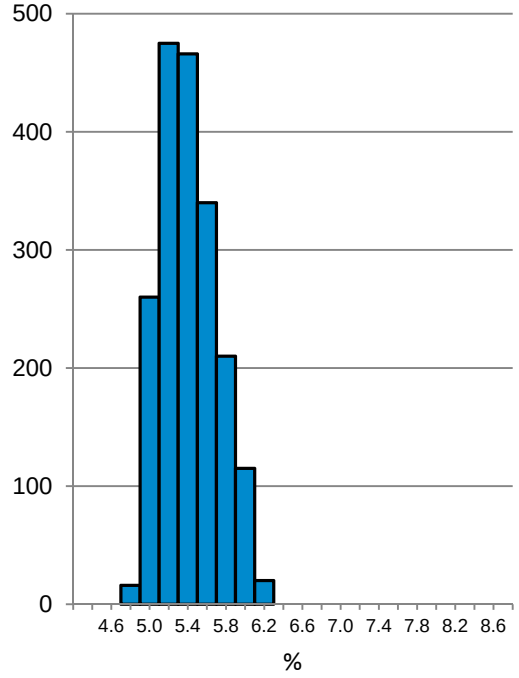
Conclusion

USTER® Think quality

HVI variations within bales

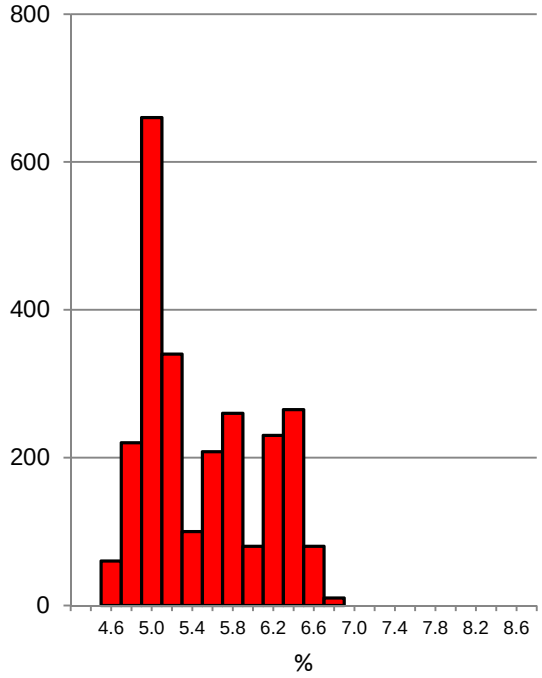
Histogram of elongation

USA MOT Cotton



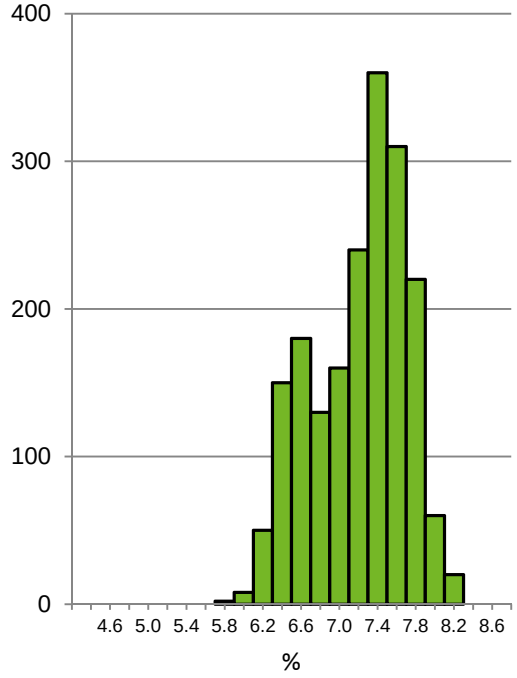
Conclusion

Mali Cotton



Conclusion

US Pima Cotton



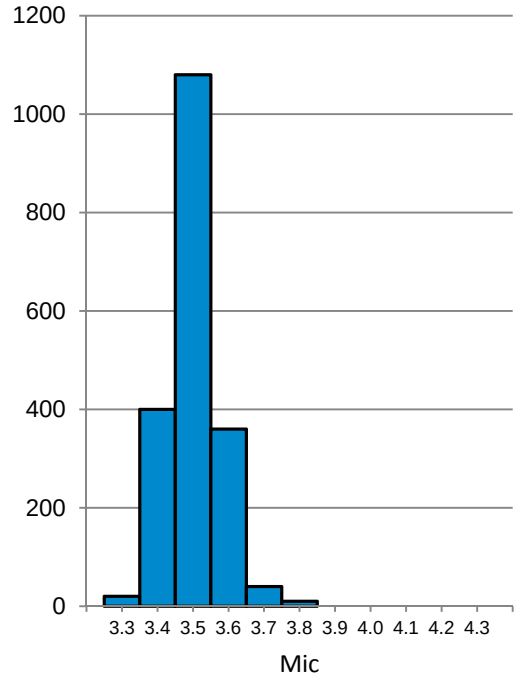
Conclusion

USTER® Think quality

HVI variations within bales

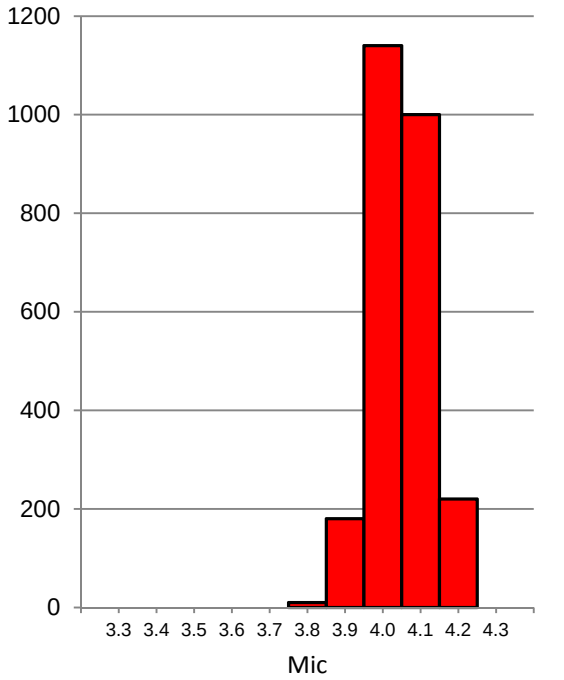
Histogram of micronaire

USA MOT Cotton



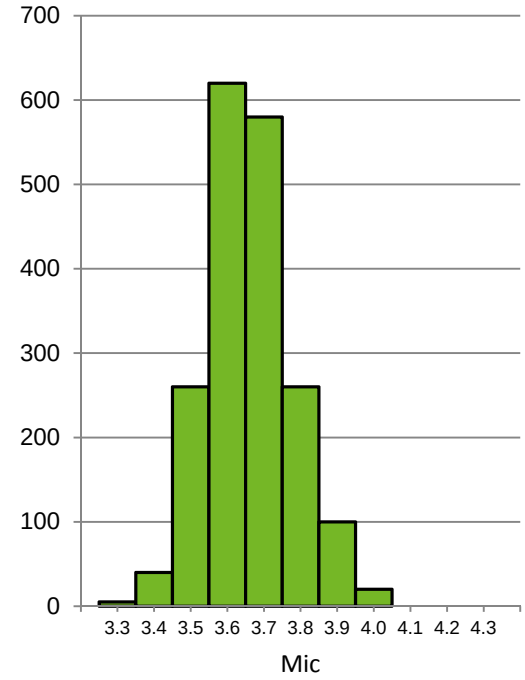
Conclusion

Mali Cotton



Conclusion

US Pima Cotton



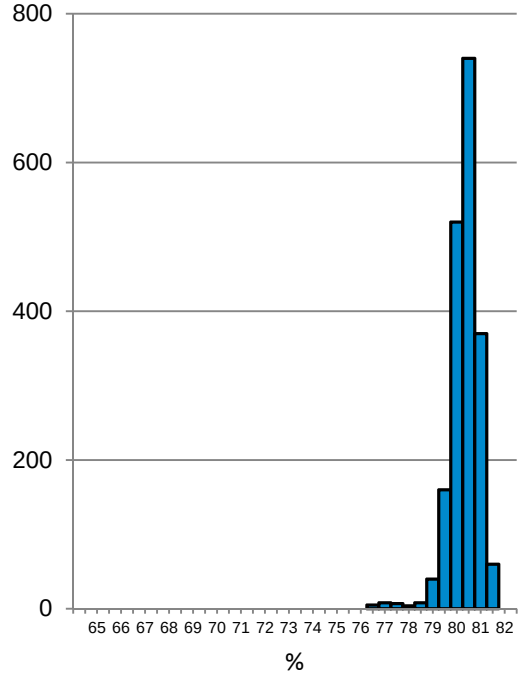
Conclusion

USTER® Think quality

HVI variations within bales

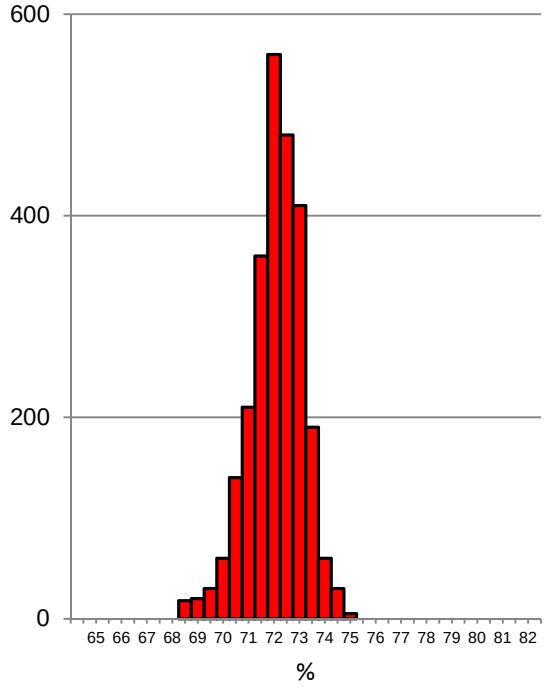
Histogram of reflectance

USA MOT Cotton



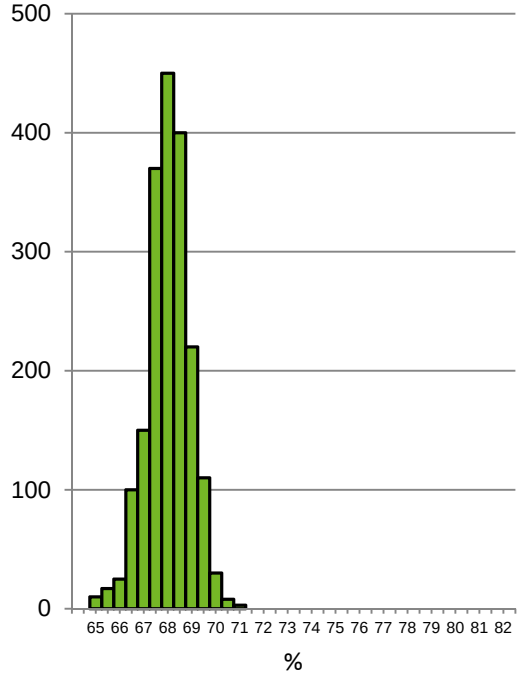
Conclusion

Mali Cotton



Conclusion

US Pima Cotton



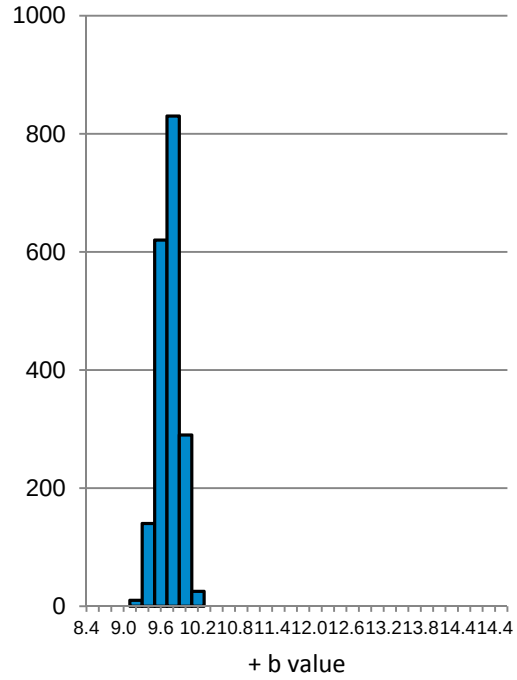
Conclusion

USTER® Think quality

HVI variations within bales

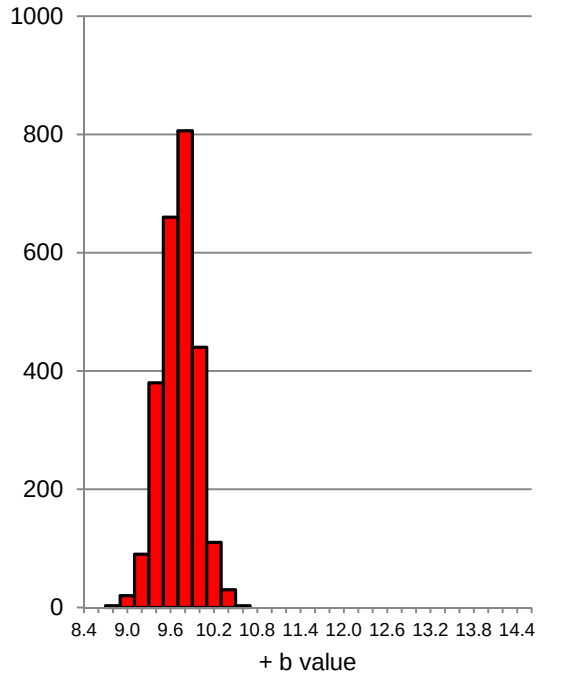
Histogram of yellowness

USA MOT Cotton



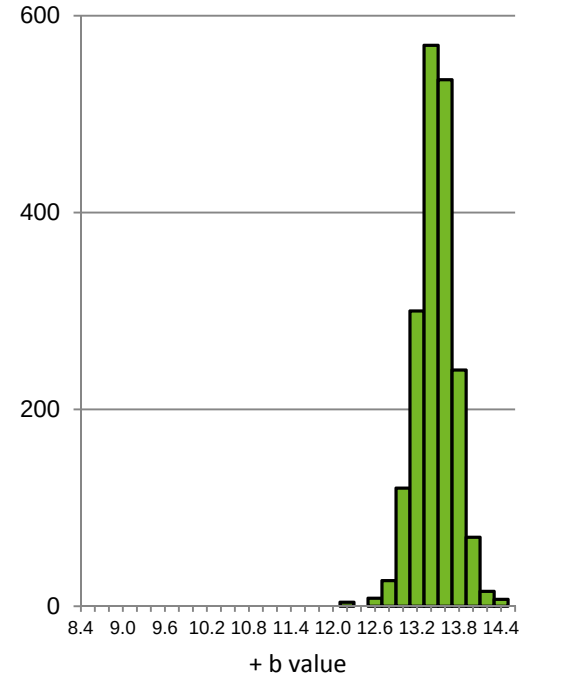
Conclusion

Mali Cotton



Conclusion

US Pima Cotton



Conclusion

USTER® Think quality

USTER®

Think quality

30+ YEARS Quality & Innovation

INTERNATIONAL COTTON CONFERENCE BREMEN 2024

MAG™ beyond quality

Novel Automation Features in High Volume Cotton Testing

- Anbarasan M -

MAG Solvics Private Limited

Coimbatore, India

ITMF ICCTM Meet 2024, Bremen

Novel Automation Features in High Volume Cotton Testing (Abstract)

M. Anbarasan
MAG Solvics Private Limited, Coimbatore, INDIA

High volume cotton testing has taken continuous and rapid strides over the years through technological advancements focused on automation and improvement in accuracy of measurement. Minimising the operator influence on results has been a key objective of such developments. The **HVT Genius 2 Fully Automatic High Volume Fibre Tester** from MAG Solvics Private Limited, Coimbatore, India incorporates several technical innovations.

The Length & Strength Module of the tester comes with a **Rotosampler** device capable of automatically preparing six combs in sequence and presenting the sample beards into the testing module. The Rotosampler device comprises of a conveyor type arrangement with the six combs mounted on it. The combs undergo a sequential set of operations one by one – sample collection, comb fillet cleaning, brushing, length and strength testing, cleaning and readiness for next sample collection. This sampling mechanism minimises operator interaction in the sample preparation process, ensures consistent sample beards for Length strength testing leading to accurate test results.

The **Micronaire Module** of the MAG HVT Genius 2 system performs the testing through an automated system. The operator is just required to weigh and place the sample in the tray. All subsequent operations are automatic, closure of lid, consolidation and insertion of sample into the chamber, measurement ejection and opening of the lid.

The MAG HVT Genius 2 system also includes an inbuilt air booster/ **air reservoir** for uninterrupted testing. The air reservoir is provided for temporary storage of air (40 litres capacity), which is brought to use when there is any interruption in air supply to the instrument. The reservoir also takes care of drop in air pressure due to any reason. This ensures that the test in progress continues and completes without any interruption.

The ergonomic design and the automation of most of the testing operations reduce fatigue on the operators and greatly improve their efficiency at work. Bundled with other innovative features, the HVT Genius 2 system provides immense benefits to the customer in terms of value addition, lower power consumption, lower compressed air consumption, savings in labour and space and ultimately lower capital cost.

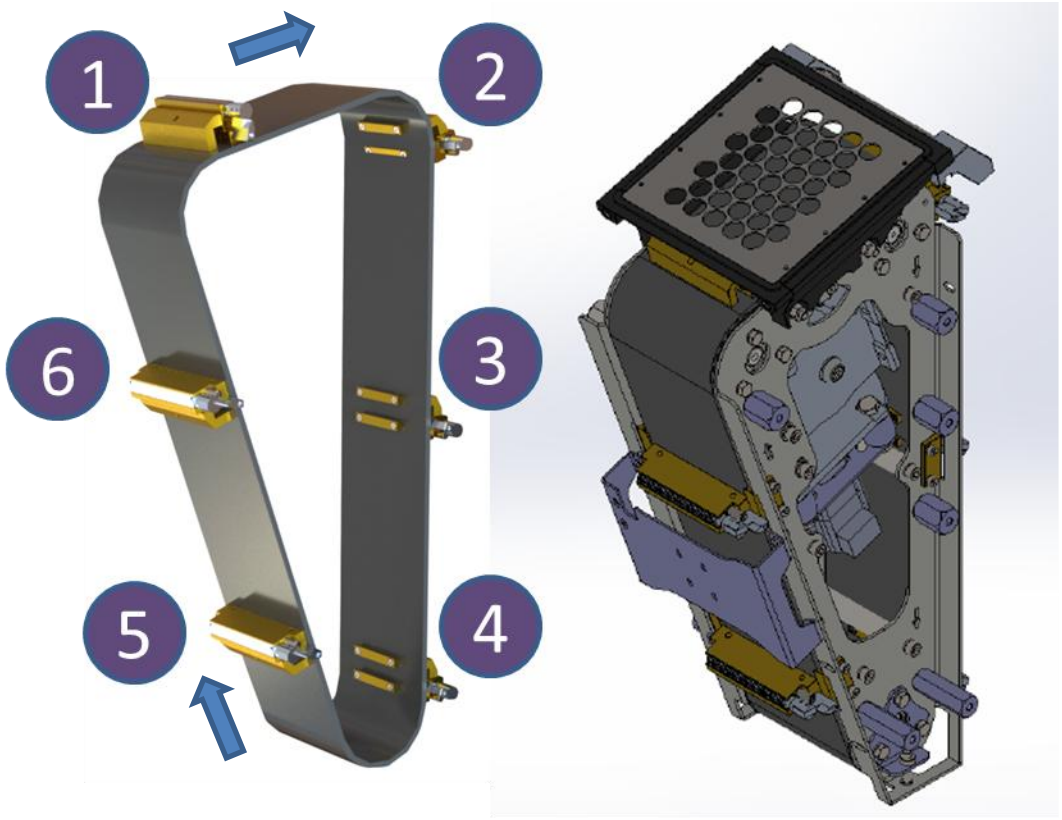
High Volume Fibre Testing - Requirements

- Measurement of all critical fibre properties
  - length, strength, fineness, maturity, color, trash, moisture etc.
- High speed of testing
- Accuracy of test results
- Minimal operator handling of samples
  - to avoid undesirable influences on results
- Minimal operator movement during testing
  - Minimum fatigue and hence efficient testing
- Optimal space requirements

MAG HVT Genius 2

- Innovative automated modules
  - Rotosampler for automatic feeding of six samples in sequence to the Length strength module
  - Automatic micronaire testing (besides weighment)
- Minimal operator movement
  - Ergonomic convenience and better testing efficiency
- Compact configuration occupying less space
- System and module testing possibility
- Simultaneous measurement of all critical fibre properties

Length Strength Testing

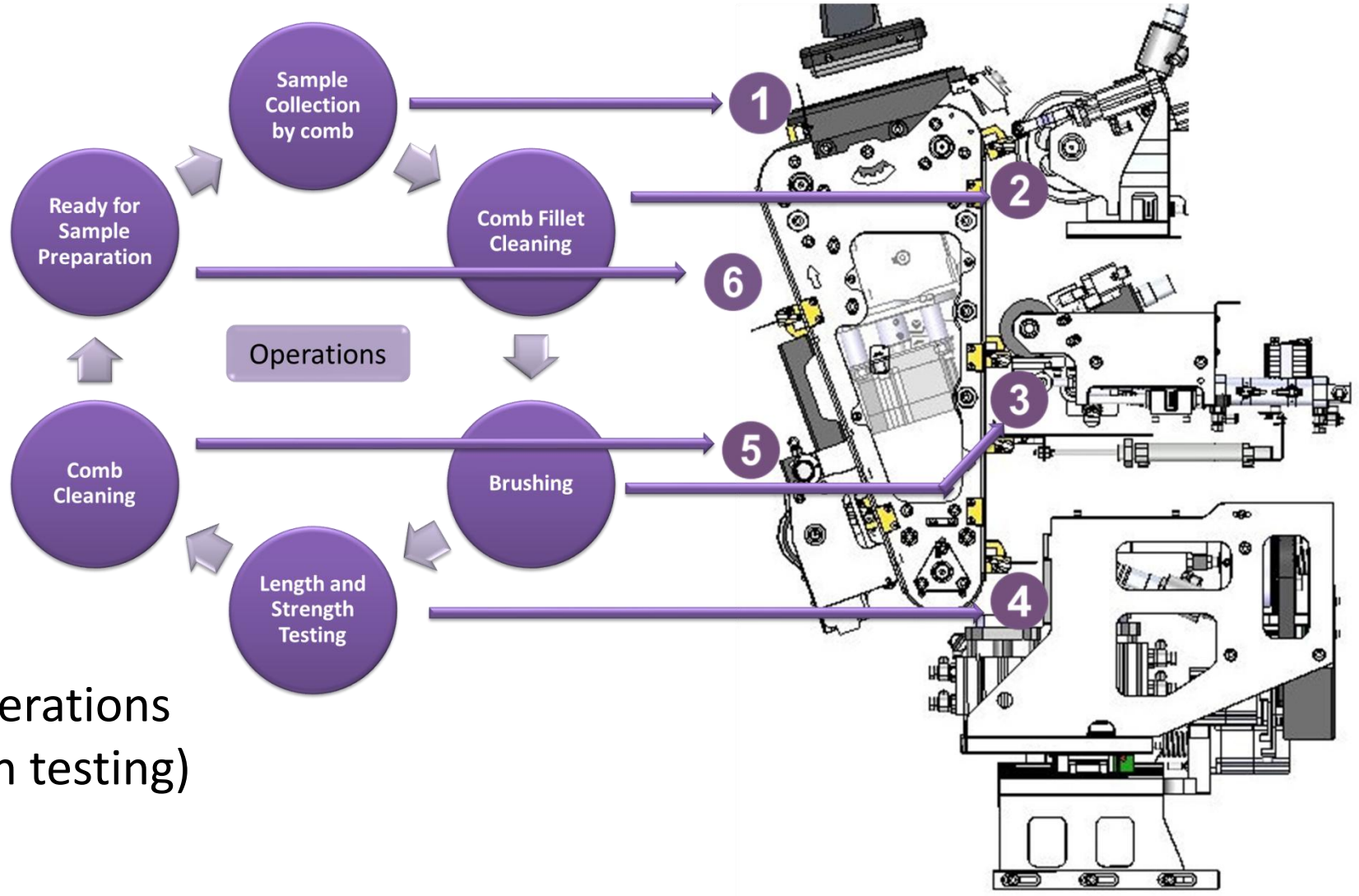


Rotosampler with six combs

Rotosampler

- Automatic feeding of six samples in sequence
- Conveyor belt type arrangement

Rotosampler



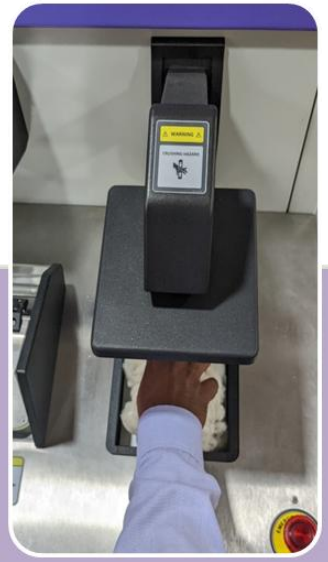
Sequence of operations
(Length strength testing)

Rotosampler - Benefits

- Minimises operator interaction
- Ensures consistent sample beards
- Provides accurate test results

Automatic Micronaire Testing

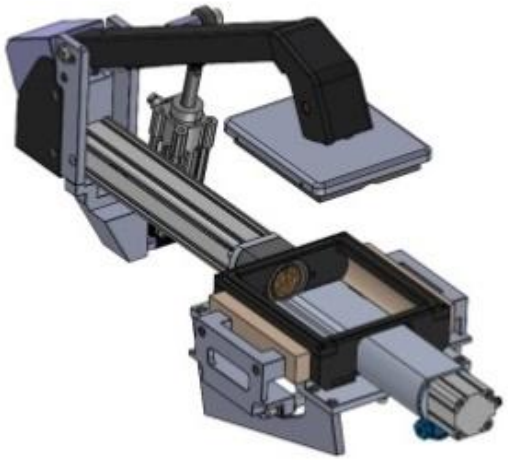
Automatic Micronaire Testing – HVT Genius 2

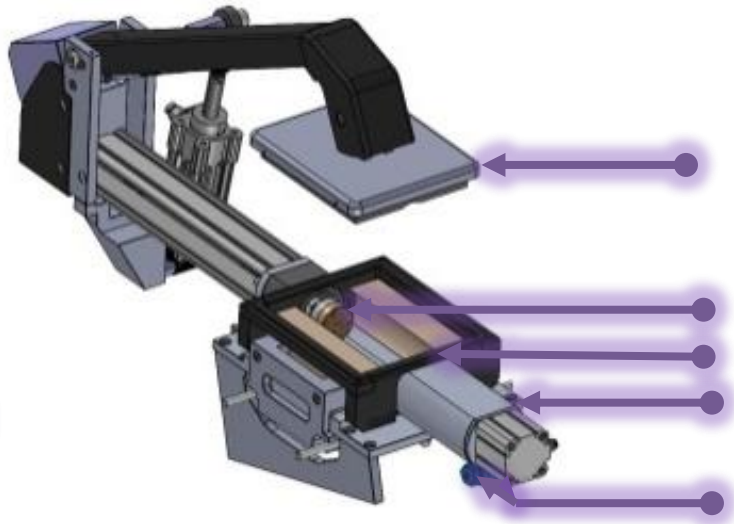

Weighment	Placement in Tray	Button Press to start test	Removal from Tray	Lid Closure, Sample Insertion, Testing, Ejection and Lid Opening

Minimal operator engagement → Automatic Processes

Automatic Micronaire Testing – HVT Genius 2



Initial position



In operation

- Sample Placement
- Lid Closure
- Sample Consolidation
- Plunger Push (into the chamber)
- Testing
- Sample Ejection
- Lid Opening
- Sample Removal

Air Reservoir

- In built air booster/air reservoir for uninterrupted testing
- 40 litres capacity
- Put to use in the event of any interruption in air supply to the instrument.
- Also takes care of drop in air pressure for any reason.

Ensures test in progress continues and completes without any interruption.

Automation Features Summary

MAG HVT Genius 2

- Inbuilt automated comb preparation for length strength testing
- Automated sample feed and testing of micronaire
- Inbuilt air booster and reservoir for uninterrupted testing
- Inbuilt industrial grade weighing balance
- Tower type construction for width wise compactness ensuring minimal operator movement
- Touch screen display and wireless integration with printer

Other Features

MAG HVT Genius 2

- Integrated testing of all important cotton fibre properties
- Module and system testing facility
- Designed to test a high sample rate
- RH and temperature sensor
- Calibration with International standard calibration materials
- Simultaneous measurement of color, surface trash and moisture

MAG HVT Genius 2+

Option to integrate gravimetric trash measurement to get a single consolidated test report

Thank You!

Comparison between different test methods for the measurement of trash

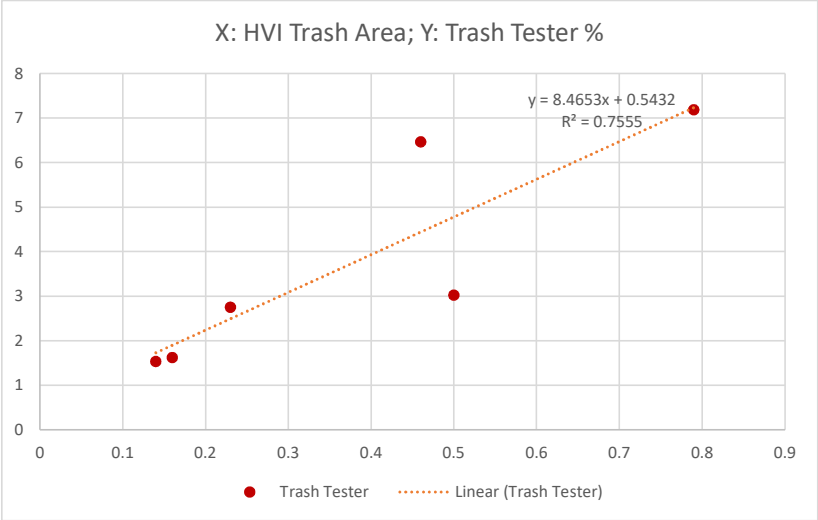
Axel Drieling, Faserinstitut Bremen e.V.

Presented at the ITMF International Committee on Cotton Testing Methods Meeting
Bremen, March 18/19, 2024

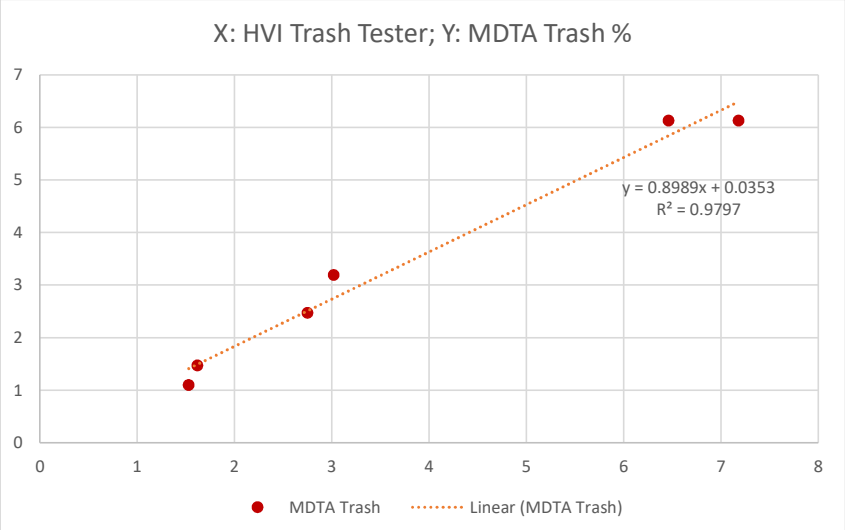
Comparison based on Round Trial Results

		Median	Median	Median	Median	Median
RT	Sample	HVI Trash Area	HVI Leaf	Trash Tester	MDTA Trash	MDTA Total Trash
RT2022-1	US-MOT -36	0.5	4	3.02	3.19	3.45
RT2022-2	Central Asia -53	0.79	5	7.18	6.13	6.41
RT2022-3	Israel Acala -41	0.14	1	1.53	1.1	1.2
RT2023-1	CIS-Uz -04	0.16	2	1.62	1.47	1.59
RT2023-2	Mali -52	0.23	2	2.75	2.47	2.66
RT2023-3	Kazak -54	0.46	4	6.46	6.13	6.36
Average		0.38		3.76	3.42	3.61

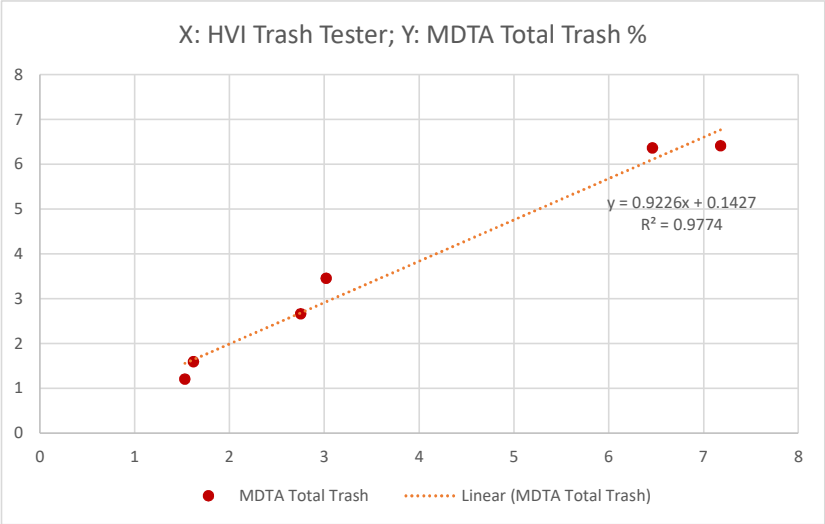
Comparison based on Round Trial Results



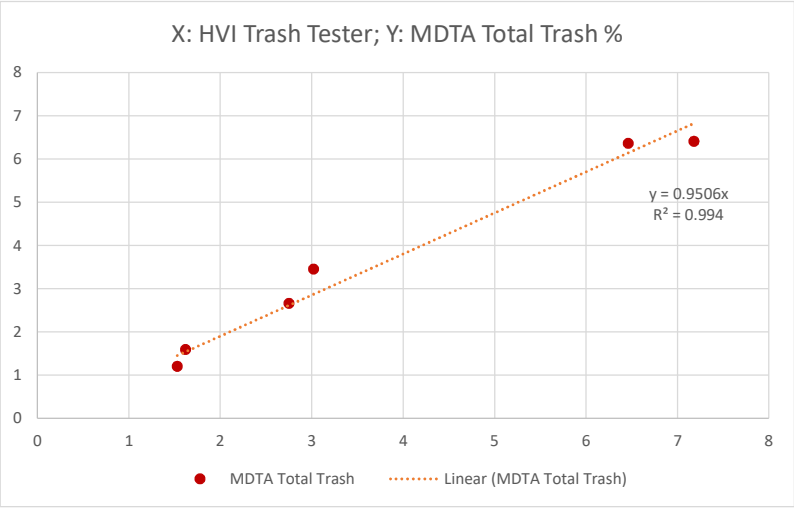
Comparison based on Round Trial Results



Comparison based on Round Trial Results



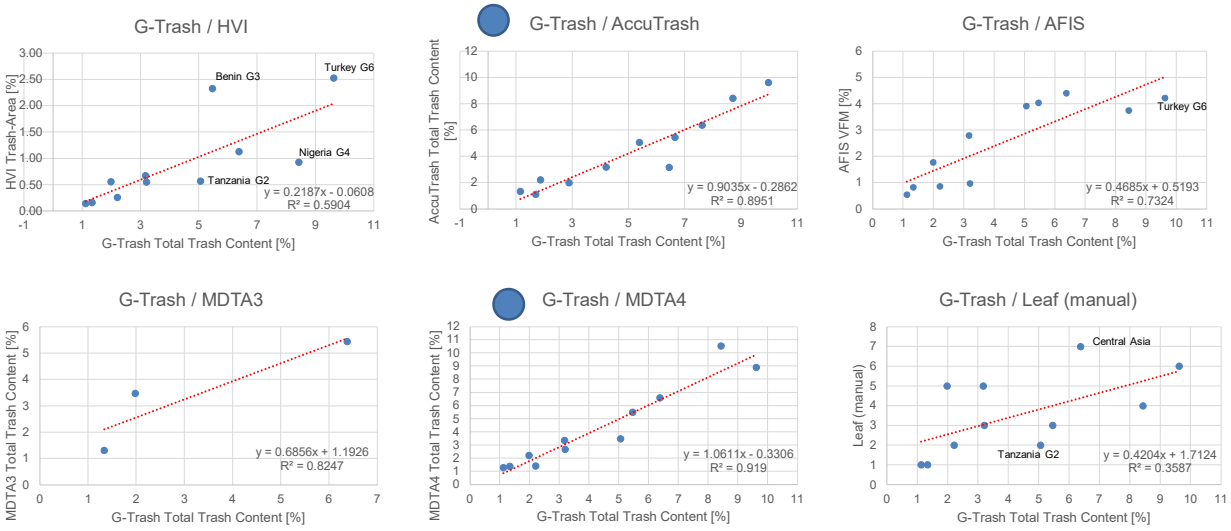
Comparison based on Round Trial Results



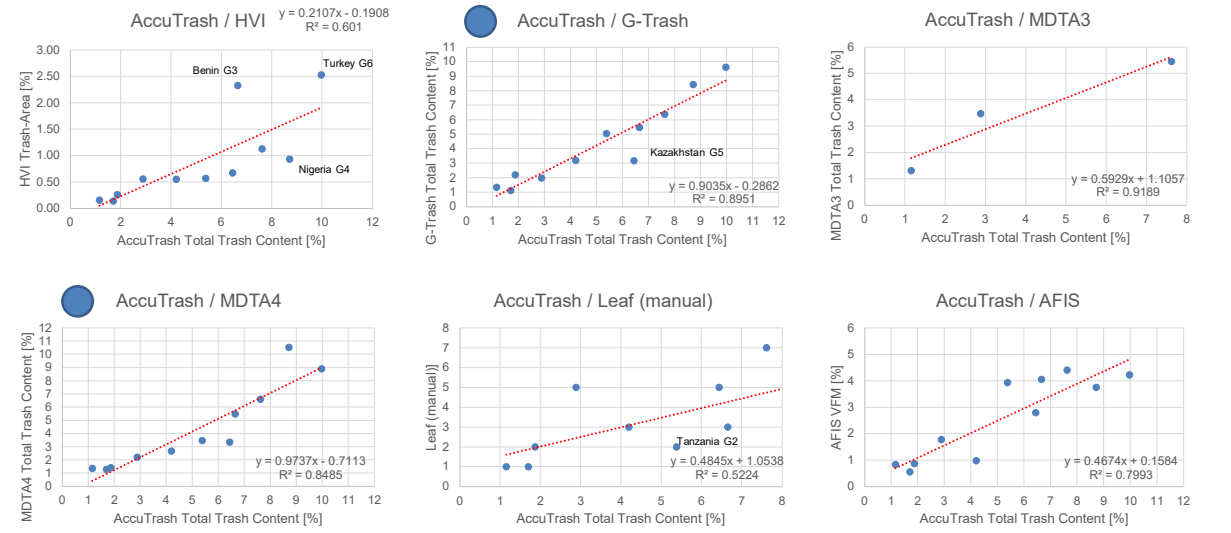
Results between simple trash testers and those analyzing MDT fit well:

- R^2 0.994
- < 5% deviation significant?

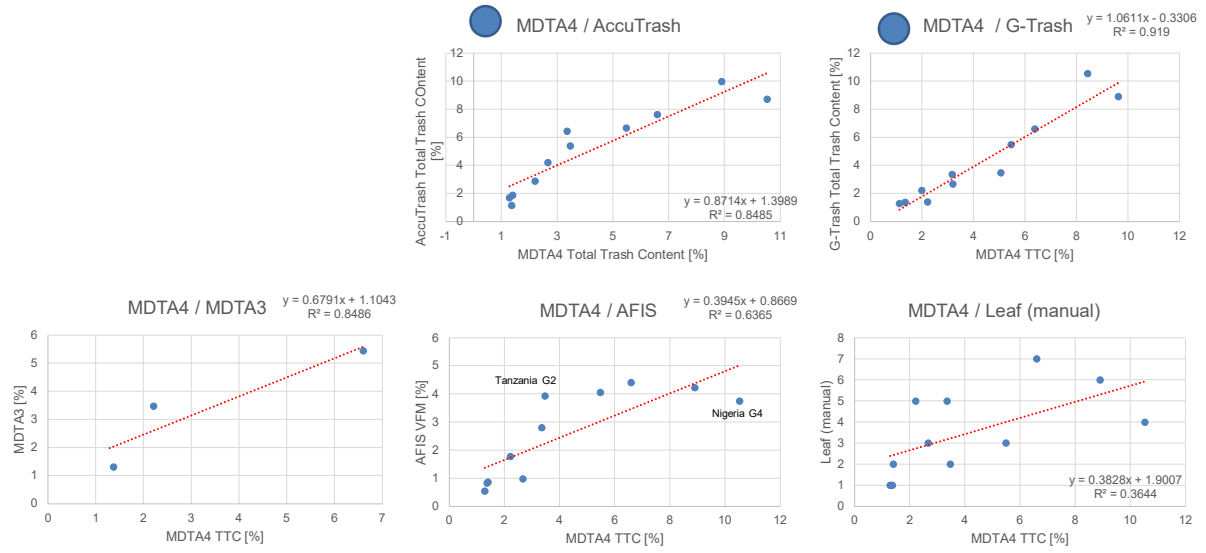
Correlations – based on G-Trash



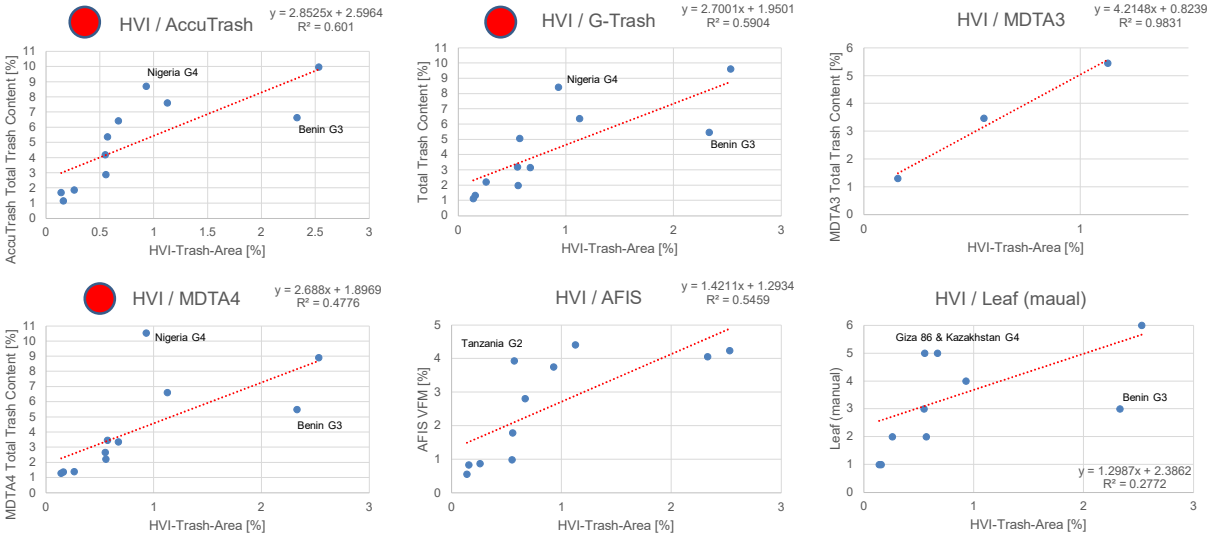
Correlations – based on AccuTrash



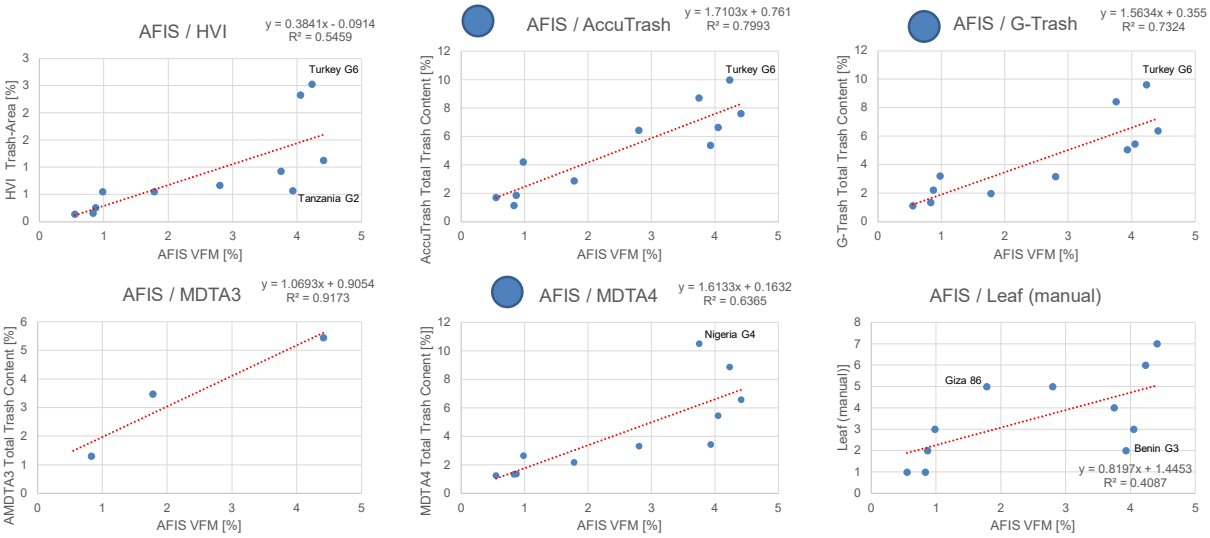
Correlations – based on MDTA4



Correlations – based on HVI



Correlations – based on AFIS

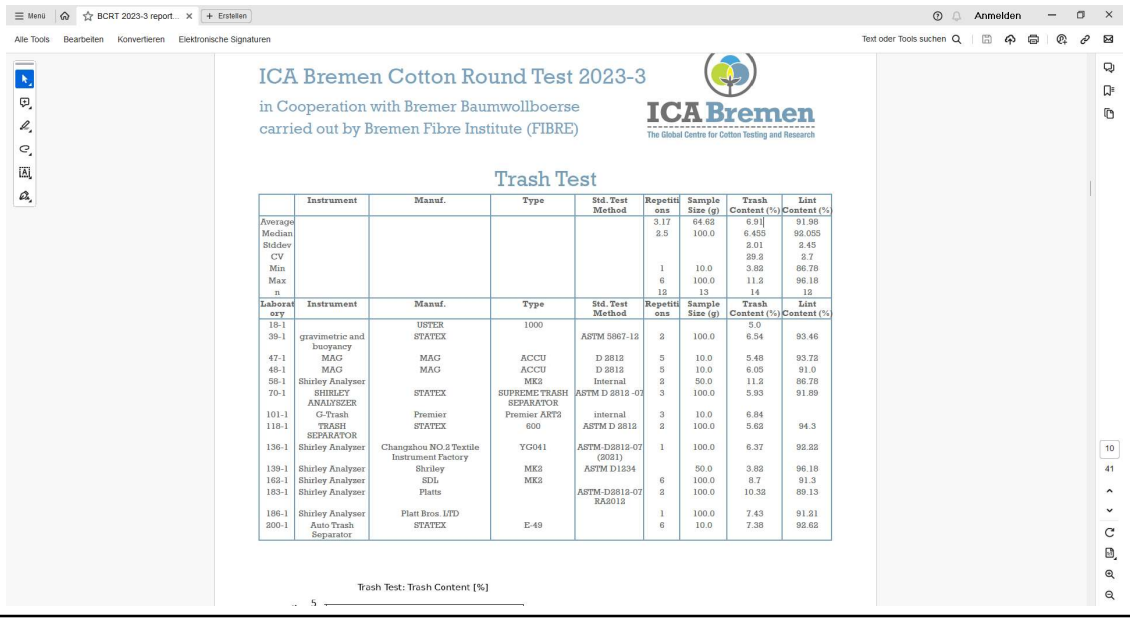


ICA Bremen Round Trials

How to separate instruments for Gravimetric Trash Measurement?

- No separation
  - difficult e.g. due to invisible trash
  - Comparison to pure trash or total trash?
- Separation into simple trash and MDT analysis
- Separation due to sample size?
- Separation into different test methods
  - Simple
    - Shirley and similar
    - G-Trash
  - MDT
    - MDTA 3
    - MDTA 4
    - AccuTrash and similar

Simple Trash Test



ICA Bremen Cotton Round Test 2023-3

in Cooperation with Bremer Baumwollboerse
carried out by Bremen Fibre Institute (FIBRE)

ICA Bremen
The Global Centre for Cotton Testing and Research

Trash Test

	Instrument	Manuf.	Type	Std. Test Method	Repetitions	Sample Size (g)	Trash Content (%)	Lint Content (%)
Average					3.17	64.62	6.91	91.98
Median					2.5	100.0	6.455	92.055
Stddev							2.01	2.45
CV							29.2	2.7
Min					1	10.0	3.82	86.78
Max					6	100.0	11.3	96.18
n					12	13	14	12
Laboratory	**Instrument**	**Manuf.**	**Type**	**Std. Test Method**	**Repetitions**	**Sample Size (g)**	**Trash Content (%)**	**Lint Content (%)**
18-1		USTER	1000				5.0	
39-1	gravimetric and buoyancy	STATEX		ASTM 5867-12	2	100.0	6.54	93.46
47-1	MAG	MAG	ACCU	D 2812	5	10.0	5.48	93.72
48-1	MAG	MAG	ACCU	D 2812	5	10.0	6.05	91.0
58-1	Shirley Analyser		MK2	Internal	2	50.0	11.2	86.78
70-1	SHIRLEY ANALYSZER	STATEX	SUPREME TRASH SEPARATOR	ASTM D 2812 -07	3	100.0	5.93	91.89
101-1	G-Trash	Premier	Premier ART2	internal	3	10.0	6.84	
118-1	TRASH SEPARATOR	STATEX	600	ASTM D 2812	2	100.0	5.62	94.3
136-1	Shirley Analyzer	Changzhou NO.2 Textile Instrument Factory	YG041	ASTM-D2812-07 (2021)	1	100.0	6.37	92.28
139-1	Shirley Analyzer	Shriley	MK2	ASTM D1234		50.0	3.82	96.18
162-1	Shirley Analyzer	SDL	MK2		6	100.0	8.7	91.3
183-1	Shirley Analyzer	Platts		ASTM-D2812-07 RA2012	2	100.0	10.32	89.13
186-1	Shirley Analyser	Platt Bros. LTD			1	100.0	7.43	91.21
200-1	Auto Trash Separator	STATEX	E-49		6	10.0	7.38	92.62

Trash Test: Trash Content [%]

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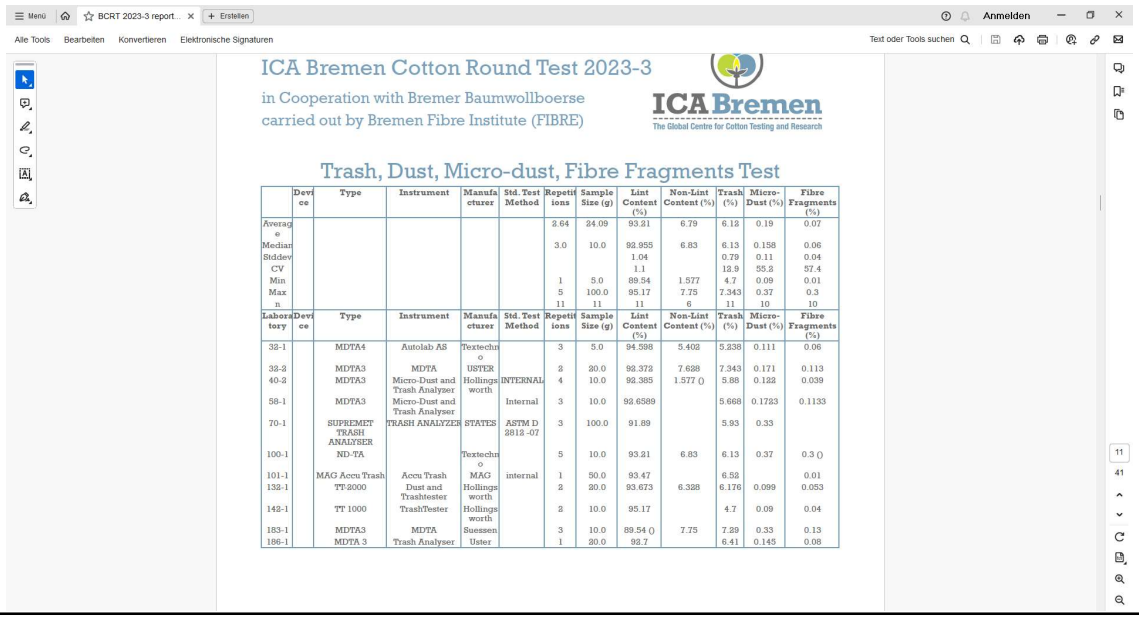
Trash Tests Dividing up into Trash, Dust, Fragements/Microdust



ICA Bremen Cotton Round Test 2023-3

in Cooperation with Bremer Baumwollboerse
carried out by Bremen Fibre Institute (FIBRE)

ICA Bremen
The Global Centre for Cotton Testing and Research

Trash, Dust, Micro-dust, Fibre Fragments Test

	Device	Type	Instrument	Manufacturer	Std. Test Method	Repetitions	Sample Size (g)	Lint Content (%)	Non-Lint Content (%)	Trash (%)	Micro-Dust (%)	Fibre Fragments (%)
Average						2.64	24.09	93.21	6.79	6.12	0.19	0.07
Median						3.0	10.0	92.955	6.83	6.13	0.158	0.06
Stddev								1.04		0.79	0.11	0.04
CV								1.1		12.9	55.3	57.4
Min						1	5.0	89.54	1.577	4.7	0.09	0.01
Max						5	100.0	95.17	7.75	7.343	0.37	0.3
n						11	11	11	6	11	10	10
Laboratory	**Device**	**Type**	**Instrument**	**Manufacturer**	**Std. Test Method**	**Repetitions**	**Sample Size (g)**	**Lint Content (%)**	**Non-Lint Content (%)**	**Trash (%)**	**Micro-Dust (%)**	**Fibre Fragments (%)**
32-1		MDTA4	Autolab A8	Textechno		3	5.0	94.598	5.402	5.338	0.111	0.06
32-3		MDTA3	MDTA	USTER		3	20.0	92.372	7.628	7.343	0.171	0.113
40-2		MDTA3	Micro-Dust and Trash Analyser	Hollingsworth	INTERNAL	4	10.0	92.385	1.577 ()	5.88	0.122	0.039
58-1		MDTA3	Micro-Dust and Trash Analyser		Internal	3	10.0	92.6589		5.668	0.1733	0.1133
70-1		SUPREMET TRASH ANALYSER	TRASH ANALYZER	STATES	ASTM D 2812 -07	3	100.0	91.89		5.93	0.33	
100-1		ND-TA		Textechno		5	10.0	93.21	6.83	6.13	0.37	0.3 ()
101-1		MAG Accu Trash	Accu Trash	MAG	internal	1	50.0	93.47		6.52		0.01
132-1		TT 2000	Dust and Trashtester	Hollingsworth		2	20.0	93.673	6.328	6.176	0.099	0.053
142-1		TT 1000	TrashTester	Hollingsworth		2	10.0	95.17		4.7	0.09	0.04
183-1		MDTA3	MDTA	Suessen		3	10.0	89.54 ()	7.75	7.39	0.33	0.13
186-1		MDTA 3	Trash Analyser	Uster		1	20.0	92.7		6.41	0.145	0.08

14

2024 ITMF-ICCTM Task Force Session

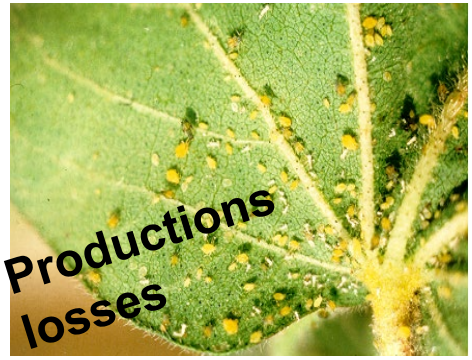
Latest developments and proposals for the future on the ‘Stickiness’ topic

Jean-Paul GOURLOT

Stickiness in spinning mill due to entomological sugars

These sugars or honeydew are mainly produced by *Aphis* and *Bemisia, …* but new insects are coming (mealybug, …, due to resistance, GMO…)

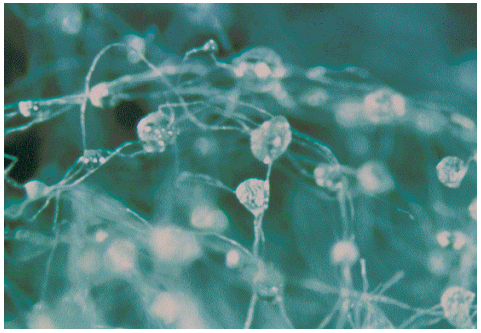
Aphis gossipii



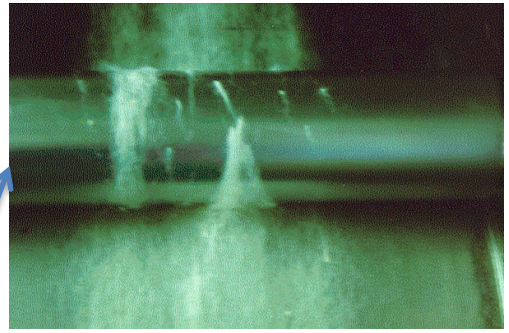
Honeydew on open boll

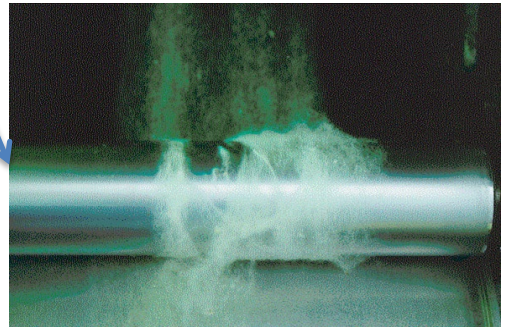
Bemisia tabaci

Honeydew in fibers



Problems **Productivity, quality** ↘





=> Need for reliable characterization (method, <u>reference material</u>, predictive of problems in spinning…)

Mandates

Reminder

Two of the mandates of the ICCTM are:

[…/…] “to harmonize cotton testing results by means of:

- a. proposition and support for the international standardization of test methods
- b. development of guidelines for testing
- **c. technical evaluations using world-wide round tests.**

and to discuss the problems related to testing of cotton fiber properties and their relations to cotton processing.”
[…/…]

Objectives of ICCTM: past and current results

Reminder

- To check the ability of each measuring technique to reproduce itself within a same single laboratory
- To check the ability of each measuring technique to reproduce itself between several laboratories
- To give some indications about the ability of various measuring techniques to correlate to each others

One RT conducted in 2013-2014

=>report 2014 and 2016 (instruments vs micro-spinning)

➔need harmonization

➔need creation of reference materials

➔proposed project … limited to a periodical round-test running since 2017…

Twelve RTs conducted since 2017

Just a point about participation in RTStick

Official reports dataset: https://doi.org/10.18167/DVN1/FIP6HF
Description of use: https://doi.org/10.18167/agritrop/00776

	Nb of LabIDs											
RT	2017		2018		2019		2020		2021		2022	
Methods	1	2	1	2	1	2	1	2	1	2	1	2
Benedict	1	-	-	-	-	-	-	-	-	-	-	-
Caramelization	4	4	5	4	5	4	3	3	4	3	2	2
Clinitest	1	1	1	1	1	1	-	-	-	-	-	-
Contest-S	4	5	***6***	***10***	***7***	***6***	***7***	***7***	***8***	***8***	***8***	***8***
GB/T13785-1992	-	1	1	1	-	-	-	-	-	-	-	-
H2SD	5	5	***9***	***8***	***9***	***7***	***7***	***8***	***8***	***8***	***8***	***9***
HSI-NIR	-	1	1	1	1	1	1		1	1	1	-
KOTITI	1	1	1	1	1	1	1		1	1	1	1
Minicard	4	4	3	3	3	3		1	1	1	1	1
MinicardC	-	-	1	1	1	1		1	1	1	1	1
Qualitative meth.	-	-	1	1				1	-	1	1	1
Quantitative meth.	1	1	2	1				1	1	2	-	2
Reactive spray/heat	1	1	-	1				-	-	-	-	-
SCT	13	11	***16***	***15***	***14***	***15***	***11***	***10***	***10***	***10***	***10***	***8***
TDM-A	-	-	1	1	-	-	-	-	-	-	-	-
Variab. SITC	-	-	-	-	5	20	20	20	20	20	20	20
Nb Labs in official reports (*)	34	33	36	33	31	29	22	21	32	35	32	33
Nb Labs (Raw+Late+MinicardC)	36	35	38	37	33	30	23	23	35	36	33	33
Nb Labs (Raw+Late+MinicardC) +VariabStick	**36**	**35**	**48**	**49**	**45**	**42**	**35**	**34**	**35**	**36**	**33**	**33**
Nb Labs (Raw+Late+MinicardC) +VariabStick+VariabSITC	*36*	*35*	*48*	*49*	*50*	*62*	*55*	*54*	*55*	*56*	*53*	*53*

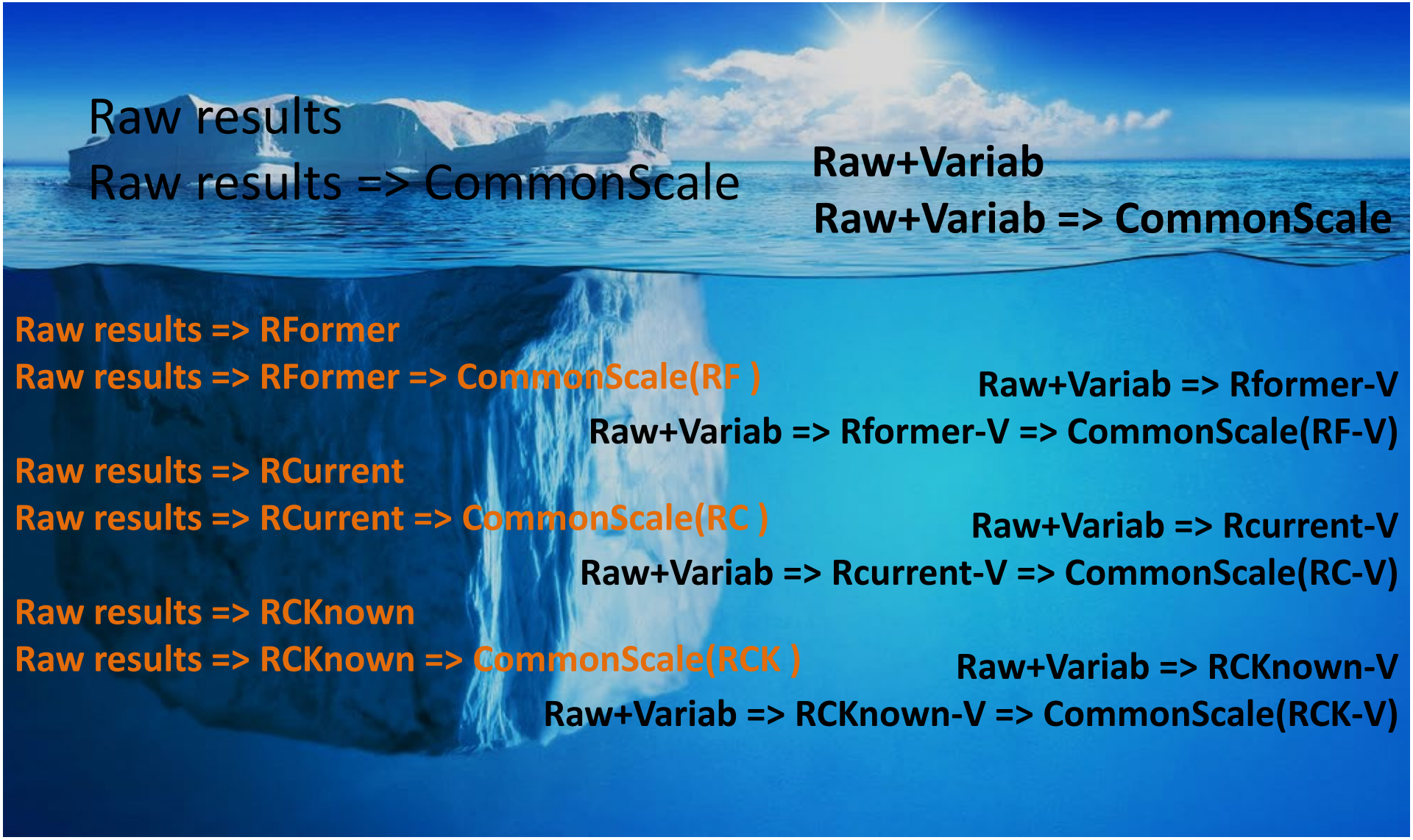
Bold=Highest participation

Underlined= retained for harmonization

All reports on:
https://www.itmf.org/committees/international-committee-on-cotton-testing-methods
Button: ICCTM Round Trials Stickiness

(*) Official participating sets included in Official reports

RT Organization and data management



My ‘dreams’ for 2022-24 … (and future)

- Harmonization based on Stickiness in Practice (SIP)
- Continuation of RTs for harmonization
- Use of Z-Score* = lab performance indicator

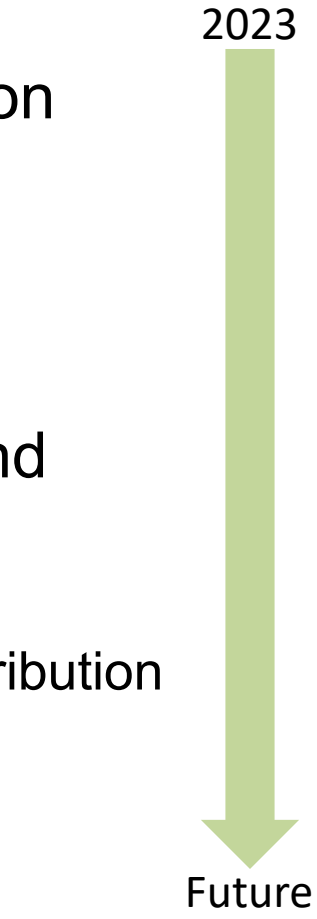
  (as proposed and implemented in RT2022-2)
- Possibility to use RefMat (based on SIP)
- Seek fund for HarCoStiC$^{(bis)}$ project?

  (Harmonization of Cotton Stickiness Characterization)

*Cordeiro F, Emons H, Robouch · Piotr. Is the z score sufficient to assess participants’ performance in proficiency testing? The hidden corrective action. *Accredit Qual Assur* 2022; 27: 145–153.

ITMF-ICCTM on Stickiness
Facts: current and future actions

- No RT in 2023
- Presentation during the coming International Cotton Conference on the link between spinnability and stickiness and more !!! (+ dataset: https://doi.org/10.18167/DVN1/GBJPGM)
- JPG: ~~Chairman~~ from the end of this session on
- Preparation and transfer of competences, tools and materials
  - RT organization, data analysis and communication
  - Reference Material (RefMat) stock, preparation and distribution
  - Expertise on stickiness measuring methods
- Possibly one RT by end of 2024
- Possibly one or two RTs / year from 2025 on…
  => to be discussed (payment?)



ITMF-ICCTM on Stickiness
Facts: current and future actions

Reference Material (RefMat) will now be available from :
Axel DRIELING (Drieling@Faserinstitut.de)

Future RTStick will be organized by FIBRE and BBB

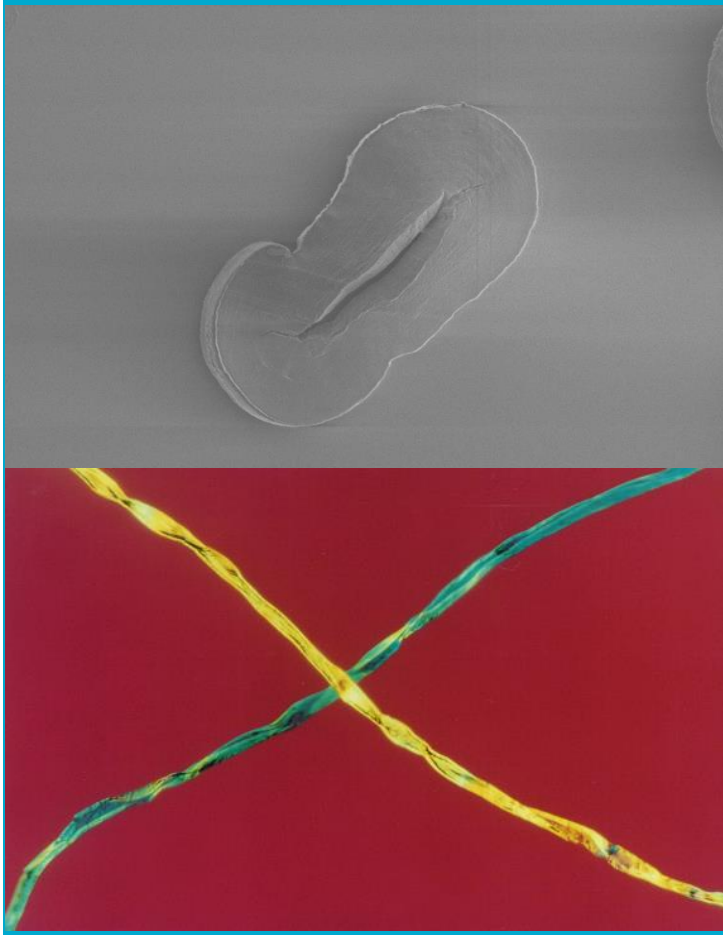
Expertise on stickiness available from FIBRE

Thanks for your kind attention

Jean-Paul GOURLOT

Former chairman of the ITMF-ICCTM Stickiness working group

ICCTM Fineness and Maturity Task Force Report



Stuart Gordon | March 2024

Outline…

- Standards & instruments in play
- Literature review update
- Crop predictions of Micronaire
- Industrial hemp fibre assessment

ASTM Standards (still) in play…

- D1442-06 (2019), Standard Test Method for Maturity of Cotton Fibers (Sodium Hydroxide Swelling & Polarized Light Procedures).
- D1464-12 (2019), Standard Practice for Differential Dyeing Behaviour of Cotton.
- D1577-07 (2018), Standard Test Methods for Linear Density of Textile Fibers.
- D5867-12 (2020), Standard Test Methods for Measurement of Physical Properties of Raw Cotton by Cotton Classification Instruments
- ***D7410-07 (2012), Standard Practice for Qualification of Cotton Classification Instruments for Cotton Marketing (withdrawn 2021)***
- D8394-21, Standard Test Method for Automated Measurement of Maturity, Fineness, Ribbon Width, & Micronaire of Cotton Fibers

GB Standards (still) in play…

- GB/T 6100-2007 (first drafted 1985), Test method for linear density of cotton fibres. *(Cut and weigh method)*
- GB/T 6099-2008, Test method for maturity coefficient of cotton fibres. (*Replaces GB/T 6099.1-1985 - Test method for maturity of cotton fiber cell wall in the cavity contrast method and GB/T 6099.2 - 1992 Test method for maturity of cotton fiber polarization meter method)*
- GB/T 13777-2006, Test method for maturity of cotton fibres - Microscopic method *(NaOH method)*

ISO (BS EN CSN) Standards (still) in play…

- BS 3181-1:1987, Determination of (Micronaire) by the single compression airflow method, which has become BS ISO 2403:2021.
- BS ISO 4912:1981 (see D1442-06), Evaluation of maturity - microscopic method.
- CSN EN ISO 10306:2014, Evaluation of maturity - airflow method (à la the FMT double compression test).

Test instruments (high volume, >3 g)…

- USTER® HVI 1000 measures Micronaire (single chamber airflow)
- PREMIER HVT measures Micronaire (single chamber airflow)
- PREMIER ART2 measures Micronaire (single chamber airflow); *mentions maturity but not method?*
- PREMIER ART3 measures Micronaire & maturity; *mentions maturity (MR) linked to 'image analysis' values?*
- MESDAN CONTEST-F2 Module 3 measures fineness, maturity & Micronaire (double compression)
- TEXTECHNO FIBROFLOW measures fineness, maturity & Micronaire (double compression)
- MAG SOLVICS DigiMic XT/FibroMic XT measures Micronaire (single chamber airflow); *mentions "provision to see maturity ratio through MicSoft"?*

Test instruments (single fibre)…

- USTER AFIS-Pro 2 (NLM Module) tests neps, seedcoat neps, length, short fibre, maturity & fineness (laser/light scatter)
- BSC ELECTRONICS COTTONSCOPE measures maturity, ribbon width & fineness, & provides a calculated estimate of Micronaire (image analysis)

Instrument verification re: FIN, MAT & MIC?

Verification – utilizing approved methods to validate testing levels

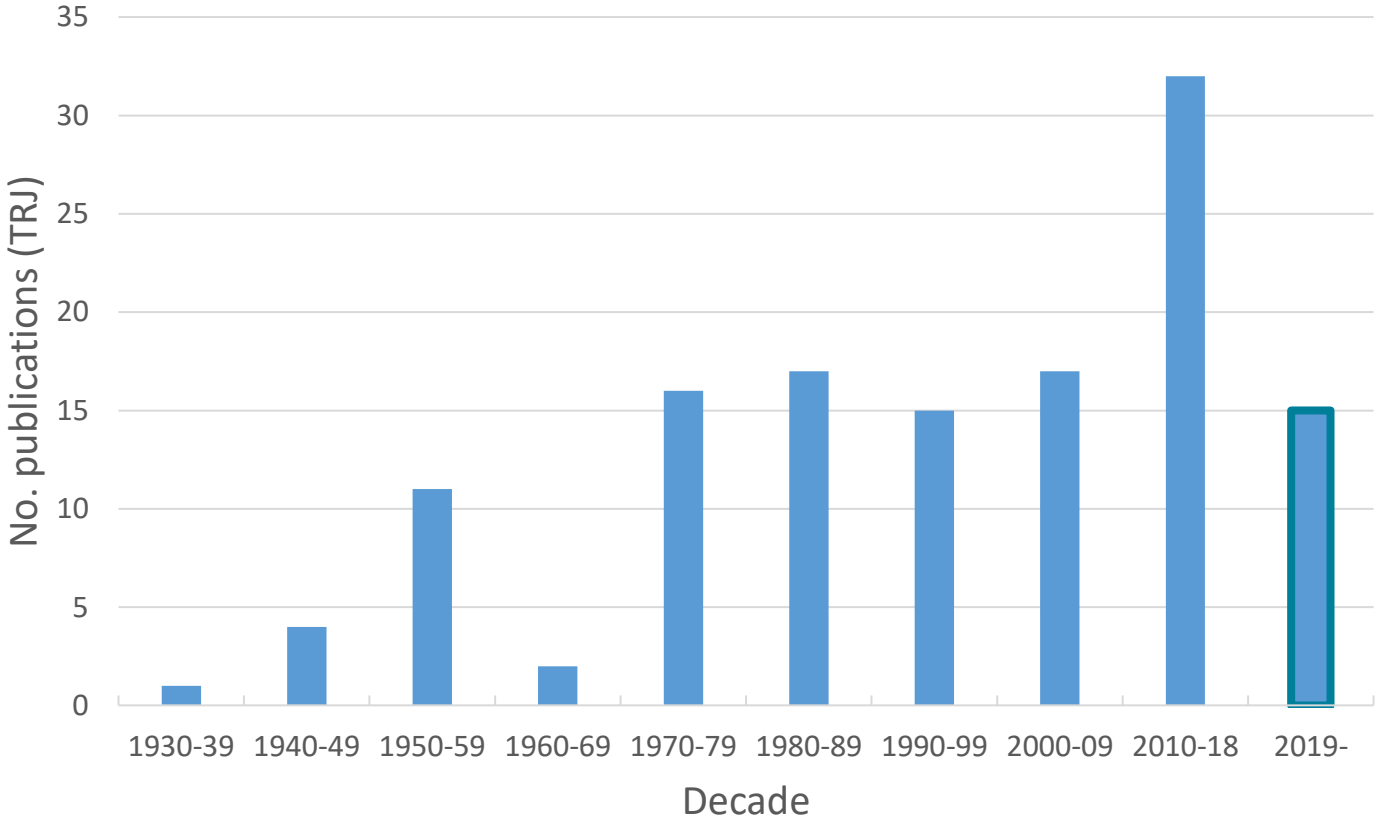
- Inter-laboratory Round Trials
- Instrument qualification (ASTM D7410)
- Within-laboratory verification

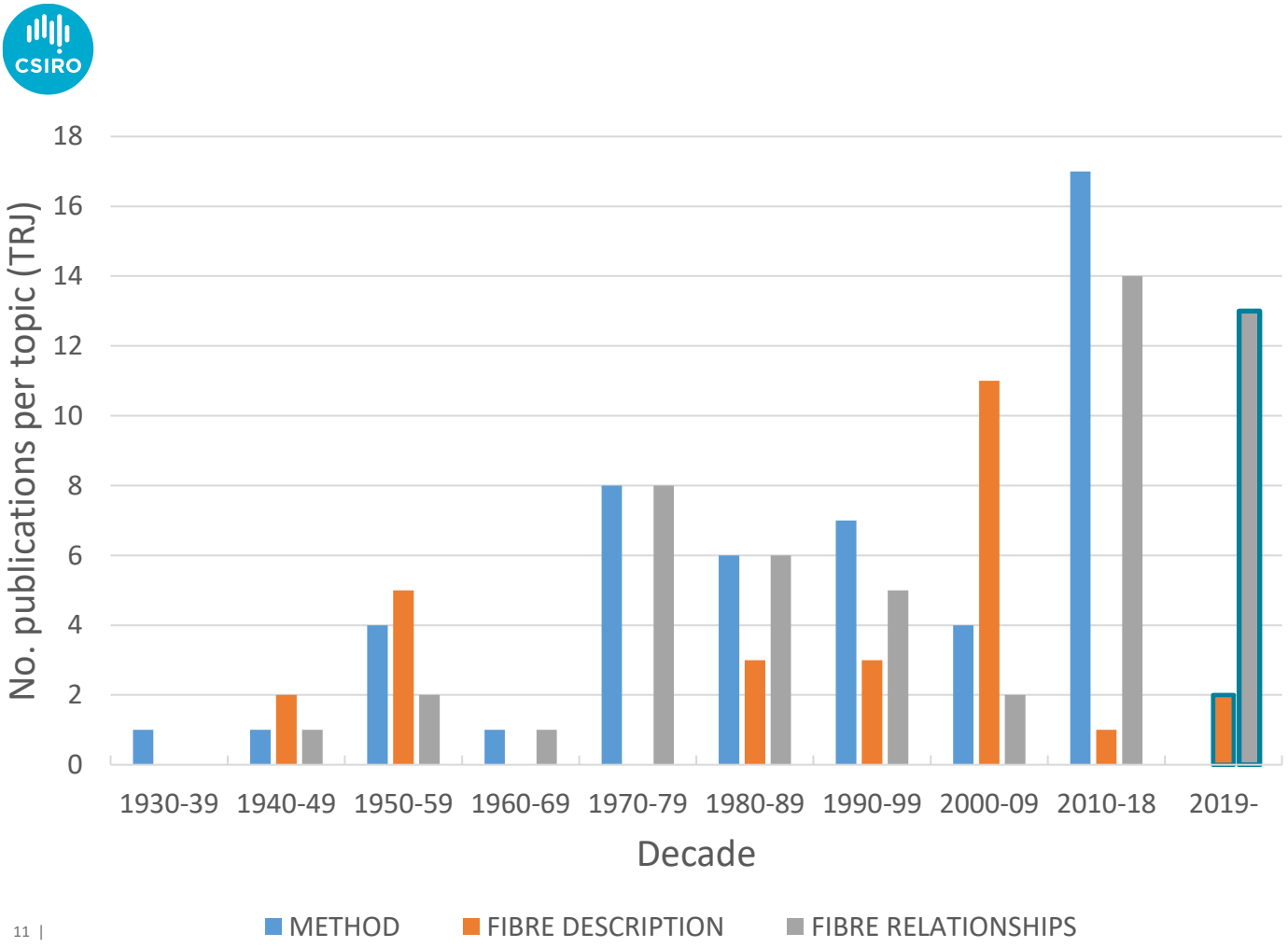
For CSITC, standardized instrument testing was defined as: Testing, according to a standardized method (ASTM D5867) and on a common scale, for any one or more of the following characteristics as defined in ASTM D5867 and currently recommended by the CSITC Task Force:

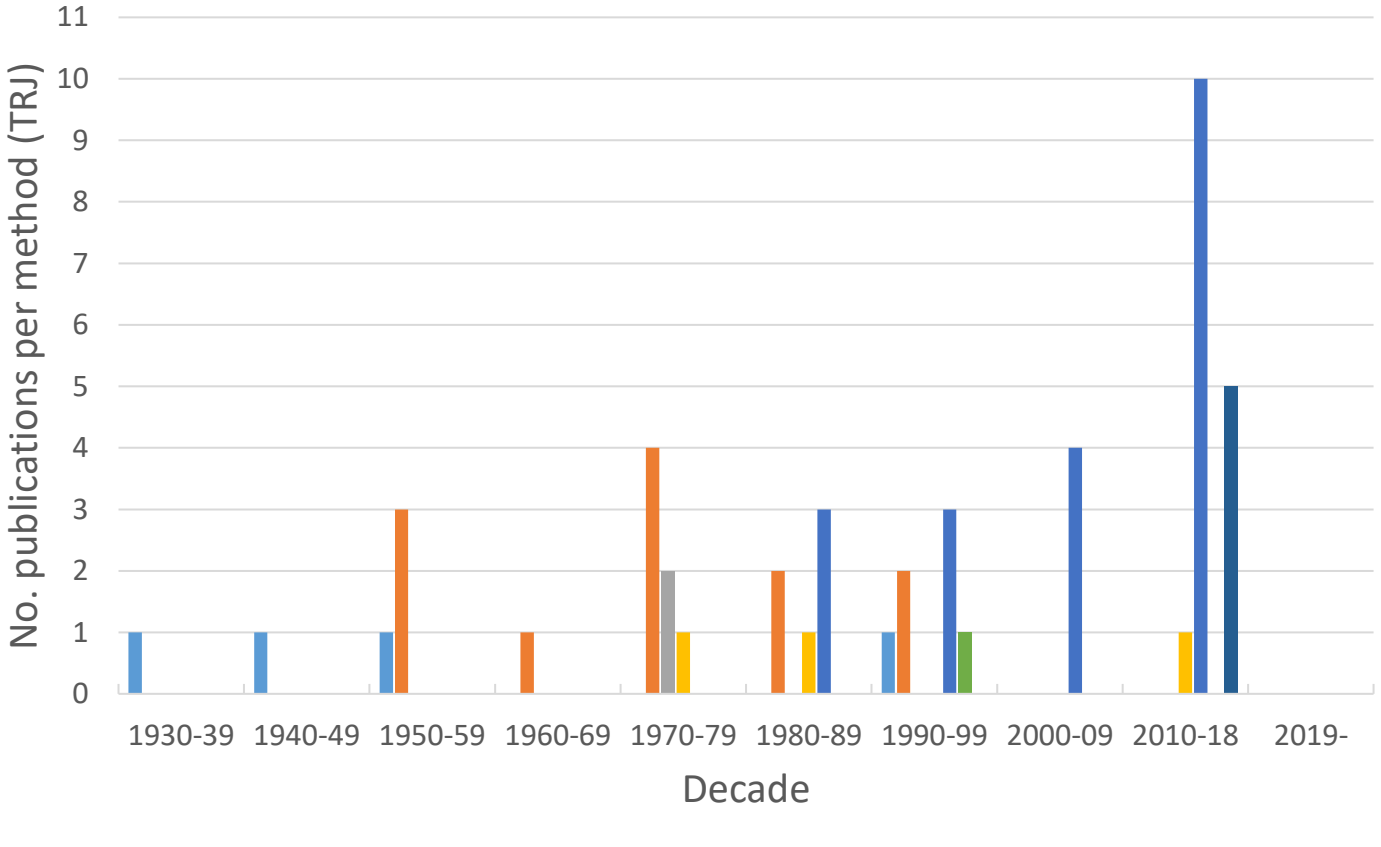
- Re: Micronaire

Literature review – update from 2018

- Fineness and maturity peer review papers (TRJ)
- Counted on decadal basis
- Subject matter classified into ‘methods’, ‘fibre descriptions’ and ‘fibre relationships’
  - Methods = focus on single test method examination and development
  - Fibre descriptions = Non-standard test is used to describe non-commercial elements of fibre, e.g., fine structure and chemical analyses
  - Fibre relationships = relationships between fibre quality and fibre treatments, e.g., field and processing treatments
- Methods classified into ‘microscopy’, ‘airflow’, ‘image analysis’, ‘optical’, ‘AFIS’ and ‘NIR’


35
30
25
20
15
10
5
0
No. publications (TRJ)
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-18
2019-
Decade

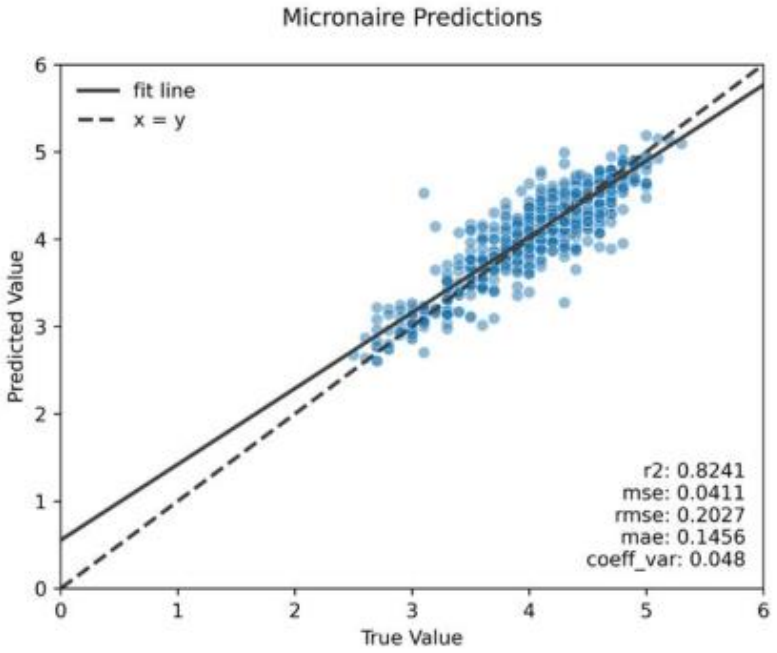

18
16
14
12
10
8
6
4
2
0
No. publications per topic (TRJ)
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-18
2019-
Decade
METHOD
FIBRE DESCRIPTION
FIBRE RELATIONSHIPS


No. publications per method (TRJ)
11
10
9
8
7
6
5
4
3
2
1
0
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-18
2019-
Decade
MICROSCOPY
AIRFLOW
AIRFLOW (dual)
OPTICAL
IMAGE ANALYSIS
AFIS
NIR

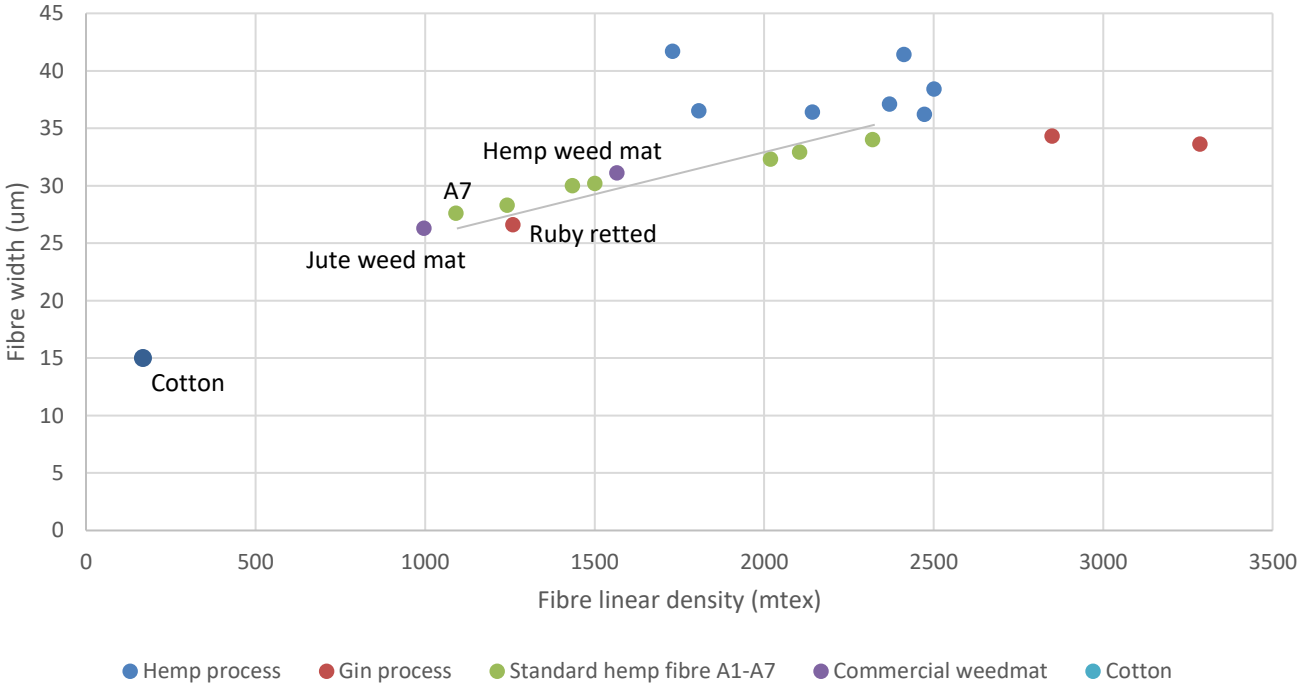
Predicting Micronaire pre-harvest

- XGBoost machine learning algorithms to explore the large CSD varietal trial dataset
- Data set includes >1200 rows of yearly variety trial data – each variety sown on 3 to 5 ha (7.5 to 12.5 acres)
- Key variables included latitude, daily average temperature and the number of days above 35^{o}C the crop experienced from date of seed imbibition to first defoliation.
- A R^2 value of 0.824 and RMSE of 0.203 means the model is robust.
- Model is available to Australian growers to monitor and modify final Micronaire (to avoid discounts) by timing defoliation.

Predicting Micronaire pre-harvest



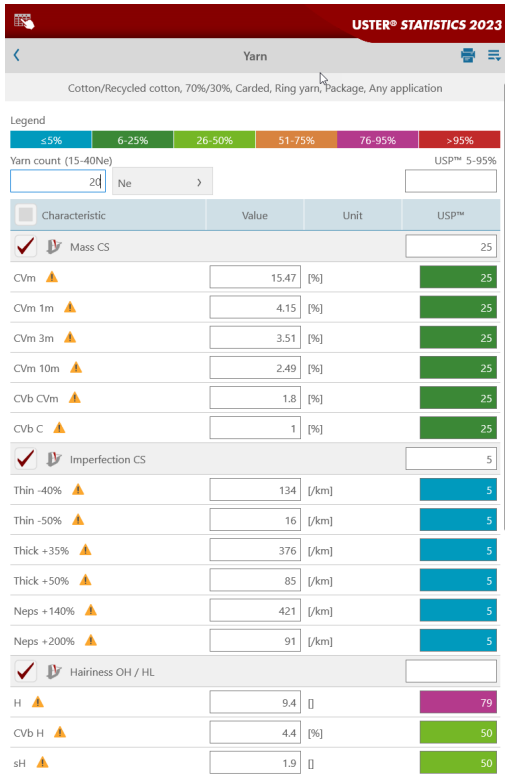
Industrial hemp fibre fineness – w/ Cottonscope

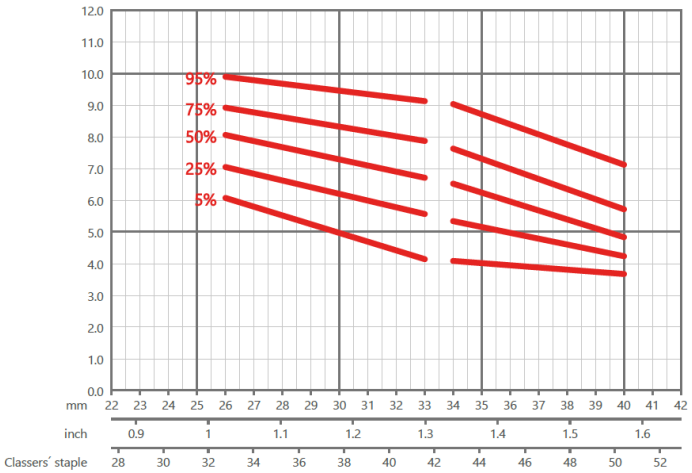


Thank you…

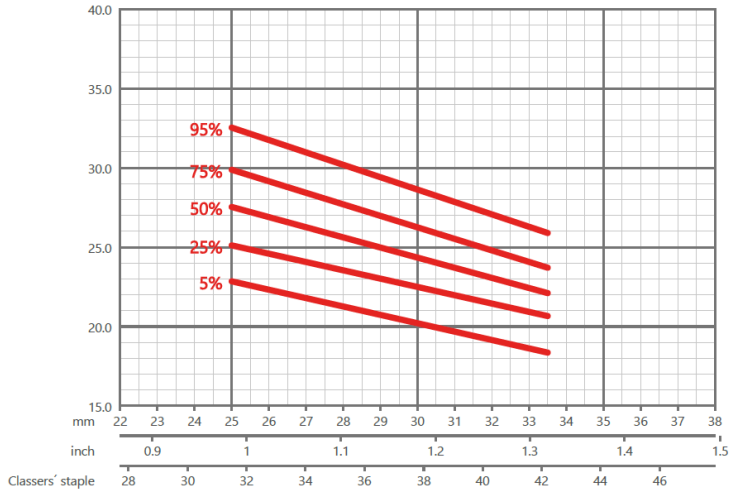
Stuart Gordon
Systems Program
CSIRO Agriculture and Food
671 Sneydes Road
Werribee, VIC 3030
AUSTRALIA

P: +61 (0)407 779 322
E: stuart.gordon@csiro.au





IFC



SFC(n)12.7mm

USTER® *STATISTICS 2023*

Additional fiber quality data

USTER® Think quality

Uster Statistics

History

Uster Standards 1957

Standardwerte U%, CV und I für kardierte Baumwolle

Standardwerte für die mittlere lineare Ungleichmäßigkeit U %

Prüfgut Matière contrôlée Testing Material			gleichmässig régulier even	mittel moyen average	ungleichmässig irrégulier uneven
English	Metric	Tex	%	%	%
Kardenband Ruban de carde Card sliver					
0,24-0,18	0,24-0,3	4200-3300	2,5 - 2,8	4 - 4,5	5 - 5,6
Streckenband 1. Pass. Etirage 1er pass. Breaker Drawing					
0,22-0,18	0,19-0,3	5300-3300	2,6 - 3,4	4 - 5	6,1- 7,8
Streckenband 2. Pass. Etirage 2e pass. Finisher Drawing					
0,18-0,28	0,3-0,47	3300-2100	2,8 - 3,5	4,5-5,6	6,7- 8,2
Grobflyer Banc gros Slubbing					
0,6-1,2	1,0-2,0	1000- 500	4,1 - 5,8	5,6- 8	7,6- 10,8
Hochverzugsflyer Banc à grand étirage Single process Roving					
1,2-2,4	2 - 4	500- 250	4,4 - 6,1	5,8-8,2	8 - 11,2
Garne, File, Yarn					
6	10	100	9	12	15,5
8	13,5	74	10,2	13,1	17
12	20	50	11,4	15,2	19,7
16	27	37	12,2	15,5	20
20	34	29,4	13	16,5	20
24	41	24,4	13,5	17,5	20,6
30	50	20	14,4	18,1	21,8
36	61	16,4	15	18,7	22,3
40	68	14,7	15	18,8	22,5

Standardwerte für den Variationskoeffizienten CV %

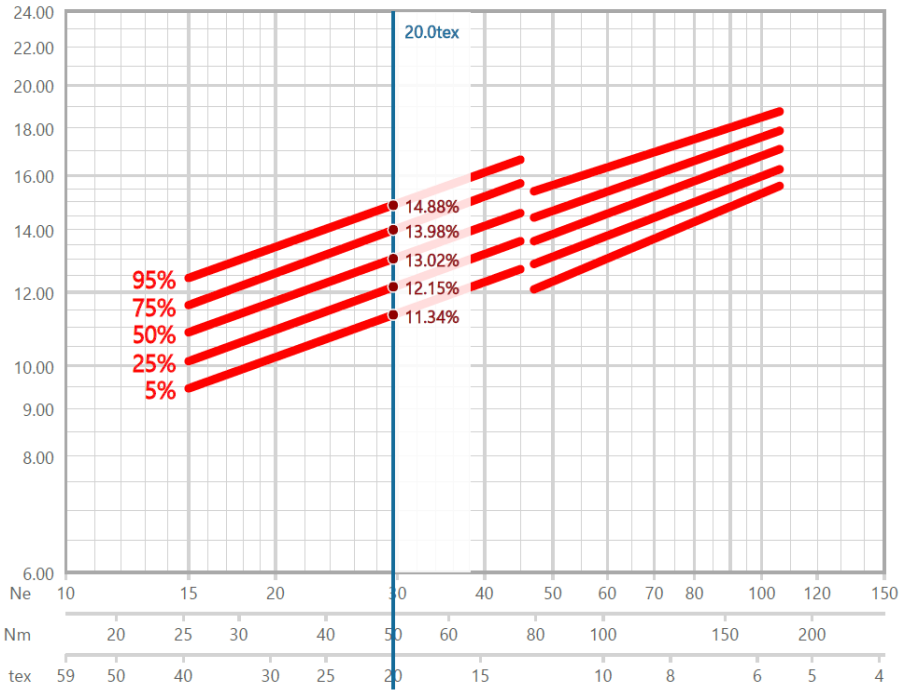
Prüfgut Matière contrôlée Testing Material			gleichmässig régulier even	mittel moyen average	ungleichmässig irrégulier uneven
English	Metric	Tex	%	%	%
Kardenband Ruban de carde Card sliver					
0,14-0,18	0,24-0,3	4200-3300	3,1 - 3,5	5 - 5,6	6,2 - 7
Streckenband 1. Pass. Etirage 1er pass. Breaker Drawing					
0,11-0,18	0,19-0,3	5300-3300	3,3 - 4,2	5 - 6,3	7,6 - 9,8
Streckenband 2. Pass. Etirage 2 e pass. Finisher Drawing					
0,18-0,28	0,3-0,47	3300-2100	3,5 - 4,4	5,6 - 7	8,4 - 10,4
Grobflyer Banc gros Slubbing					
0,6-1,2	1,0-2,0	1000- 500	5,1 - 7,2	7,7 - 10	9,6 - 13,6
Hochverzugsflyer Banc à grand étirage Single process Roving					
1,2-2,4	2 - 4	500- 250	5,5 - 7,6	7,2 - 10,2	10 - 14
Garne, File, Yarn					
6	10	100	11,5	15	19,5
8	13,5	74	12,7	16,3	21
12	20	50	14,5	19	24,6
16	27	37	15,2	19	25
20	34	29,4	16,2	20,6	25
24	41	24,4	17,0	21,7	25,8
30	50	20	18	22,6	27,2
36	61	16,4	18,8	23,5	27,8
40	68	14,7	18,8	23,5	28,2

Standardwerte für den Ungleichmäßigkeitsindex I

Prüfgut Matière contrôlée Testing Material			Kardierte Baumwolle, Cotton carded, Carded Cotton		
English	Metric	Tex	gleichmässig régulier even	mittel moyen average	ungleichmässig irrégulier uneven
Kardenband Ruban de carde Card sliver					
0,14-0,18	0,24-0,3	4200-3300	5	8	10
Streckenband 1. Pass. Etirage 1er pass. Breaker Drawing					
0,11-0,18	0,19-0,3	5300-3300	6	9	14
Streckenband 2. Pass. Etirage 2e pass. Finisher Drawing					
0,18-0,28	0,3-0,47	3300-2100	5	8	12
Grobflyer Banc gros Slubbing					
0,6-1,2	1,0-2,0	1000- 500	4	5,5	7,5
Hochverzugsflyer Banc à grand étirage Single process Roving					
1,2-2,4	2 - 4	500- 250	3	4	5,5
Garne, File, Yarn					
6	10	100	2,8	3,7	4,8
8	13,5	74	2,7	3,5	4,5
12	20	50	2,5	3,3	4,3
16	27	37	2,3	2,9	3,8
20	34	29,4	2,2	2,8	3,6
24	41	24,4	2,1	2,7	3,2
30	50	20	2	2,5	3
36	61	16,4	1,9	2,35	2,8
40	68	14,7	1,8	2,25	2,7

English = engl. Baumwollnummer, Metric = metr. Nummer, Tex = universelle internat. Nummer

Uster Statistics 2023



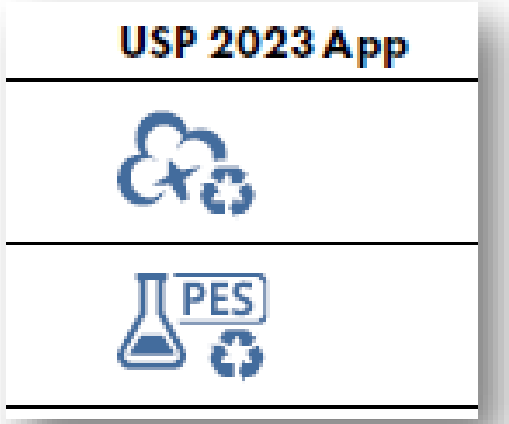
CVm

- Proven to be an excellent tool over more than 66 years
- Globally used by spinning mills, knitters, weavers, yarn traders machine manufacturers
- Today over 4,500 graphs are published

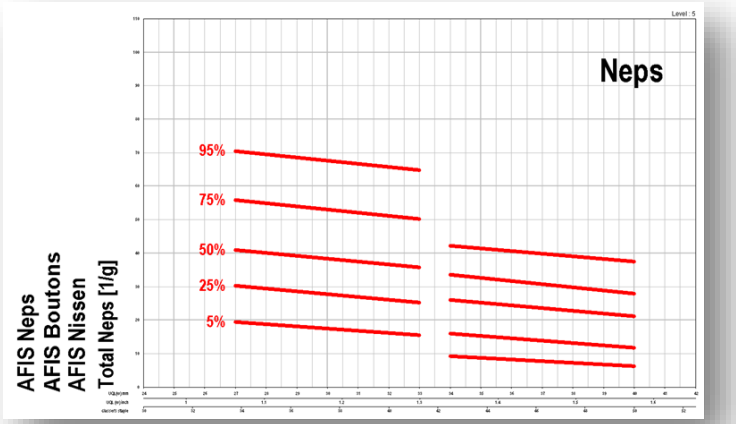
USTER® Think quality

Uster Statistics

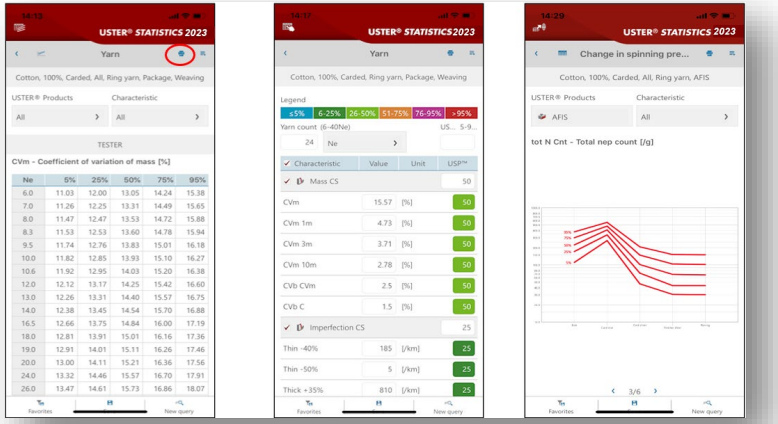
Summary of highlights 2023



- Introducing for the first time five yarn blends for **recycled yarns**



- **Fiber graphs** for every process step from bale to roving



- Available as intuitive **app**

Uster Statistics

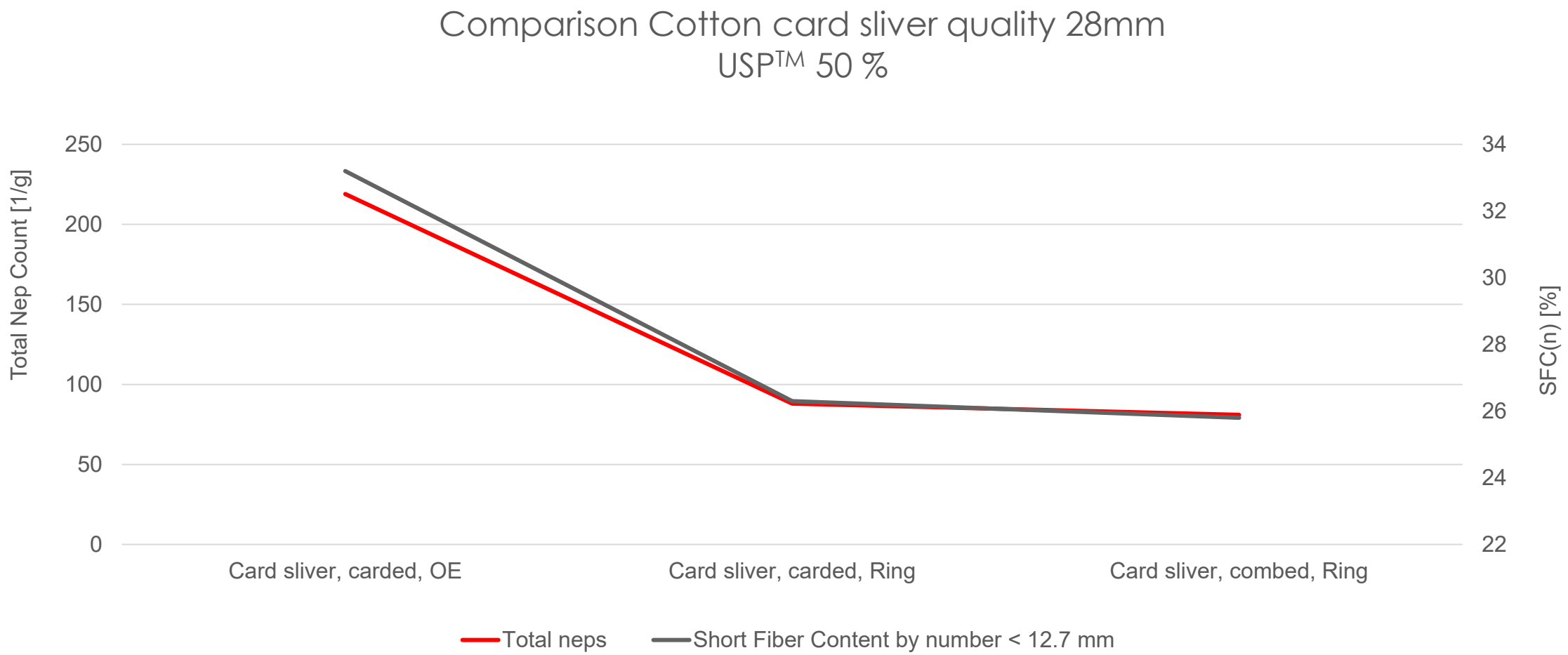
Introduction of a range of new fiber graphics

New fiber quality data:

- Cotton fiber quality dependent on final application
  - bale, card mat, card/comber/finisher sliver, roving
  - carded, combed
  - Open End (OE), Ring, Compact
- Fiber quality data for Cotton/Polyester blends
  - finisher sliver
  - 50/50 – 75/25% carded CO/PES, Ring and OE
  - 50/50 – 60/40% combed CO/PES, Ring and Compact

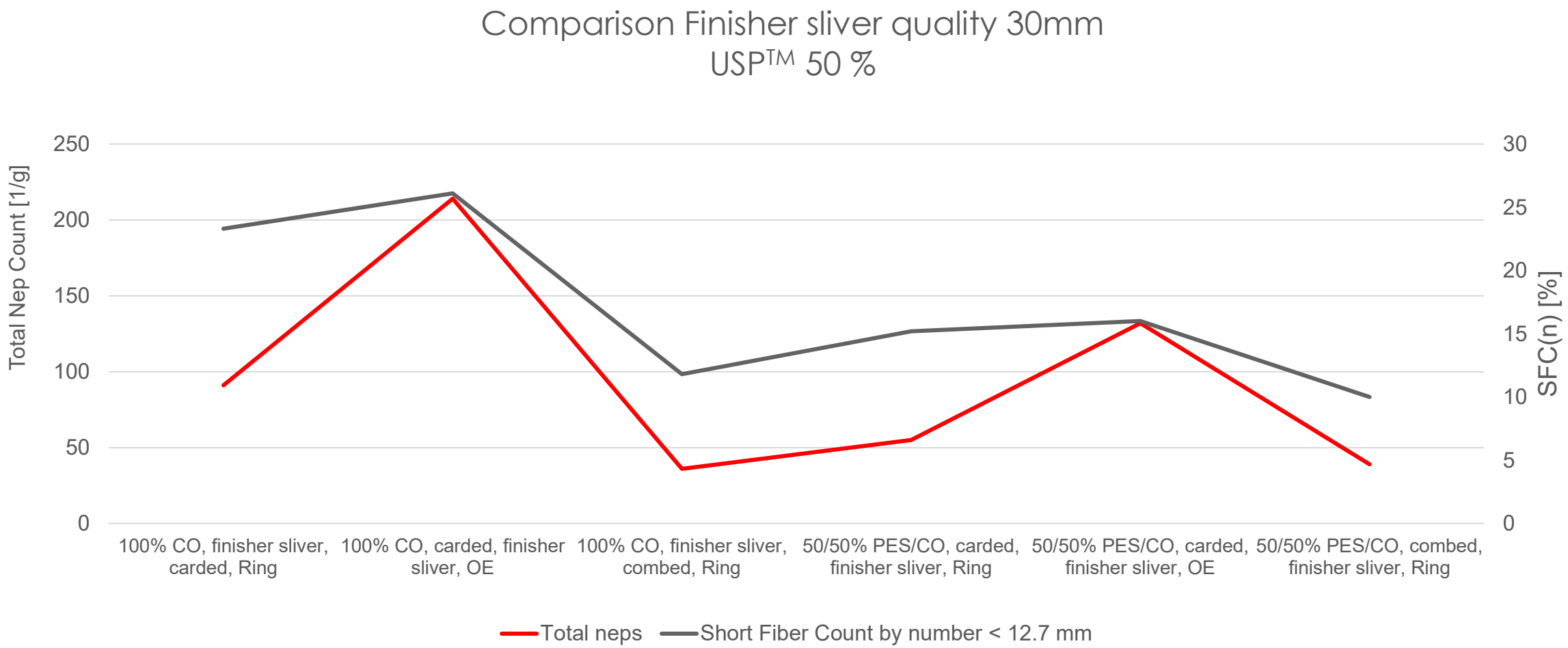
Uster Statistics

Trends in the textile market



Uster Statistics

Trends in the textile market



Uster Statistics
QR codes to the Uster Statistics 2023 app

App Store (for iOS)

Google Play (for Android)

USTER®

Think quality

Recycled Fibers: Nep Testing with MDTA 4 and NT-DA

Dr. G.Kugler, Dr. S. Fliescher, F.Liebhold

Textechno
textile testing technology

Structure of the lecture

- *Introduction*
- *Nep Testing on recycled fibres– Approach*
- *Sample A - remaining yarn pieces*
- *Sample A – Neps quantity*
- *Sample B – remaining yarn pieces*
- *Sample B – Neps quantity*
- *Test report of NTDA – Example*
- *Summary 1*
- *Summary 2*
- *Summary 3*

Textechno
textile testing technology

Introduction :

There are currently hardly any recommendations for the evaluation of recycled fibers, WHICH parameters are the most important parameters to evaluate/describe their quality.

In fact, each manufacturer uses its own characterization scheme:

a) *The measured length/strength parameters, tested with FIBROTEST/FIBROLENGTH, are very important for assessing the quality.*
b) *The percentage of remaining yarn pieces in the recycled fibers plays a big role. This parameter can be tested using the MDTA 4/NTDA Modul.*
c) *The third parameter that comes into the game: the quantity and size of the neps. This parameter is clearly important for the SPINNER but also for the manufacturer of the recycled fibers. This form of characterization is now increasingly requested by the processors of recycled fibers, the spinners.*

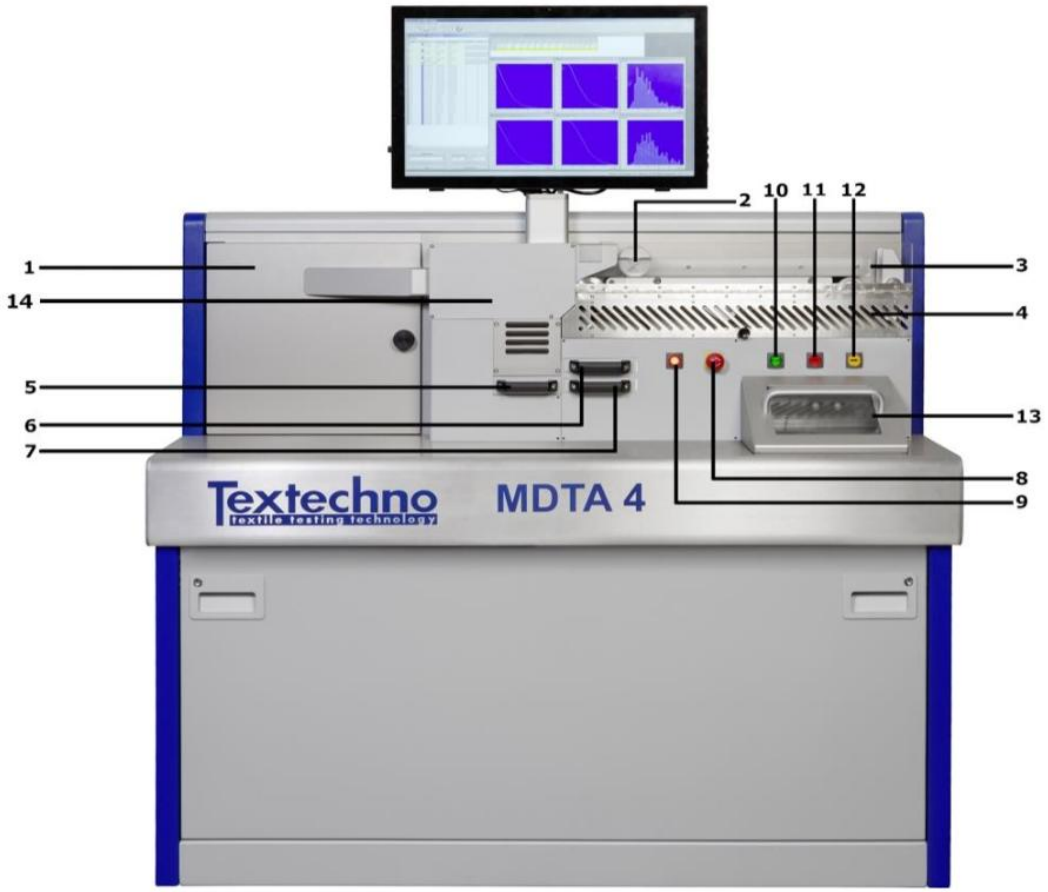
NOTE:

- *Fiber length is – according to Recycled Claim Standard (RCS) and Global Recycling Standard (GRS) – are an important aspect for detecting "recycled fibers" .*
- *FIBROTEST and FIBROLENGTH therefore are standard devices for fiber length tests on recycled fibers.*

Textechno
textile testing technology

MDTA 4

Micro-Dust and Trash Analzer 4



1 – Rotor/ Collection chamber
2 – Transportation roller
3 – Feeding belt
4 – Hinged vertical cover
5 – Trash tray
6 – Fragment Tray
7 – Dust Tray
8 – Emergency button
9 – Power-on button
10 – Start button
11 – Stop button
12 – Reverse button
13 – Collection chamber
14 – Covered feeding and opening roller

NT DA Modul

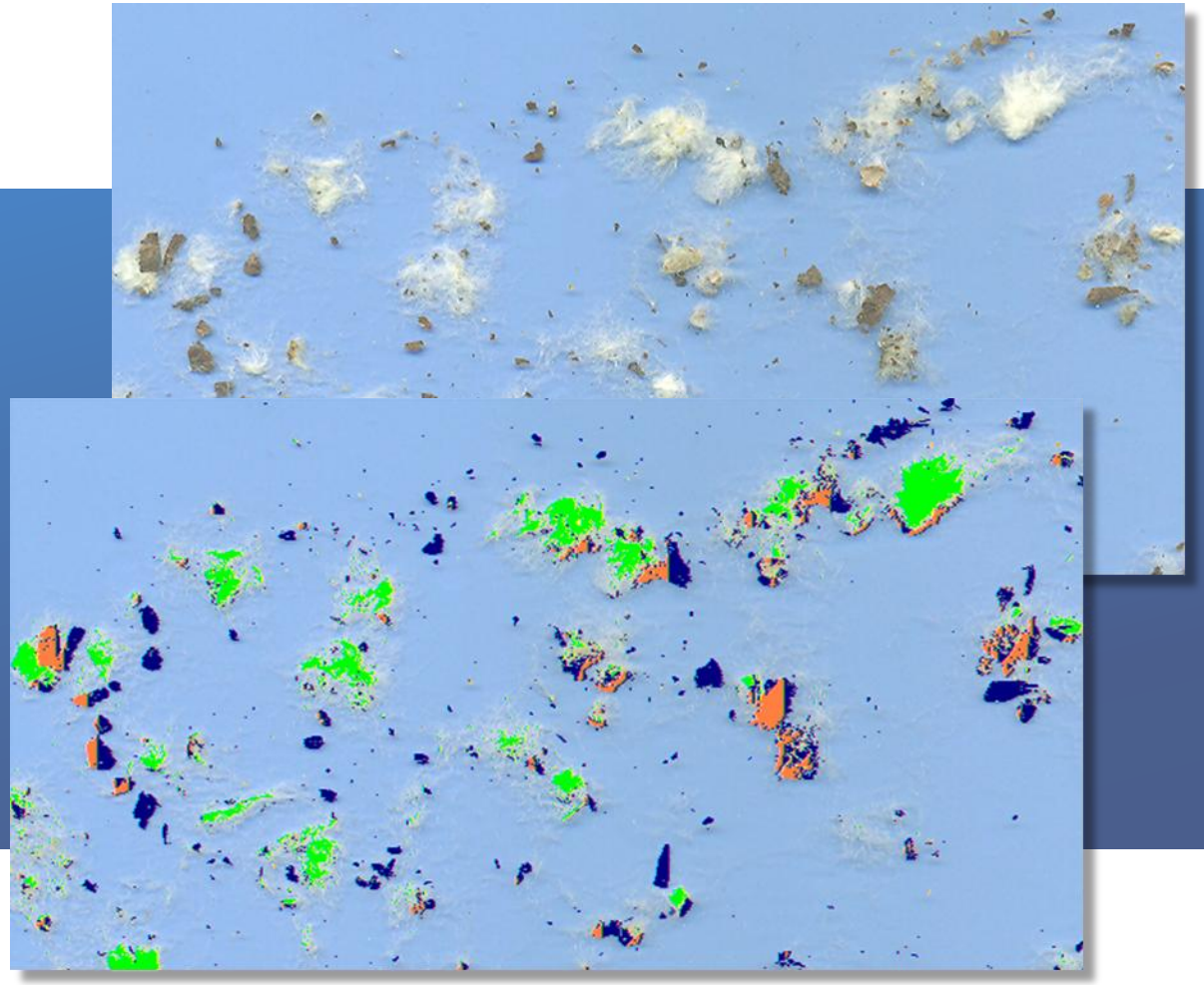
Neps- and Trash Digitaly Analyzis

NT DA Modul :
Consists of a high resolution scanner and Image Analysis software to detect coarse impurities (neps, trash, SCN in case of cotton testing or remaining yarn pieces and neps in case of recycled fiber testing).

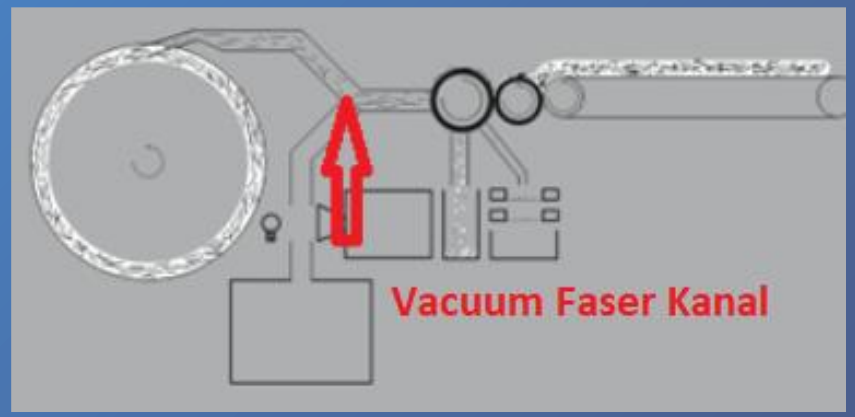
NT DA Modul

Neps- and Trash Digitaly Analyzis

NT DA Modul :
Consists of a high resolution scanner and Image Analysis software to detect coarse impurities (neps, trash, SCN in case of cotton testing or remaining yarn pieces and neps in case of recycled fiber testing).

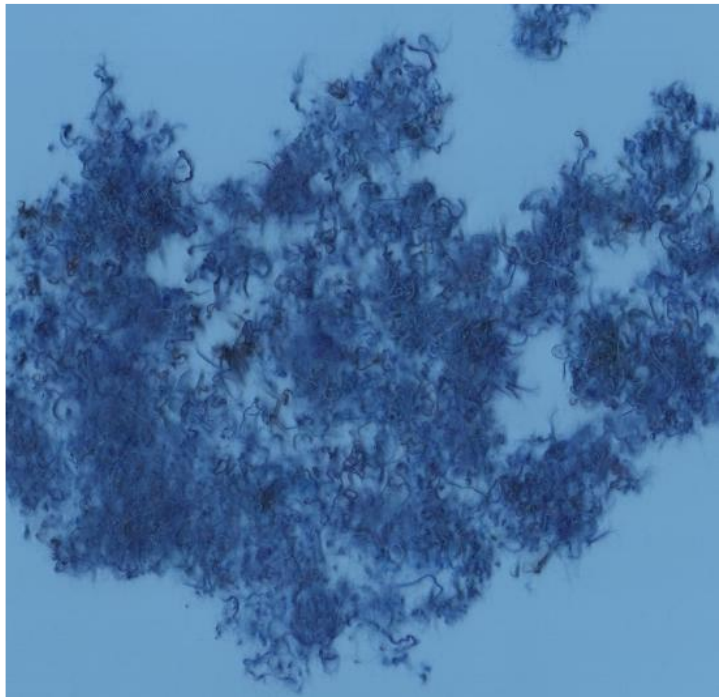


Neps testing on recycled fibres – Approach :



Schematic of MDTA 4

- *Neps – just like remaining yarn pieces within recycled fibres – belong to the "coarse contaminants" in recycled fibers!*
- *Each testing method/device separates the clean fibers from the coarse contaminants in the same way: you will always find both contaminants together in the trash box of the applied tester MDTA 4.*
- *If you remove the contents of the trash box from the MDTA 4 and place it on a scanner, you will see the following image for a denim recycled fiber:*



- *To test the neps, you first need to separate the neps from the remaining yarn pieces!*
- *By using the MDTA 4 this is possible: The mass of the neps is less than the mass of the remaining yarn pieces. If the vacuum for the fibre channel is set correctly (refer to left image), the neps go to the ROTORING and the yarn pieces remain in the trash box.*

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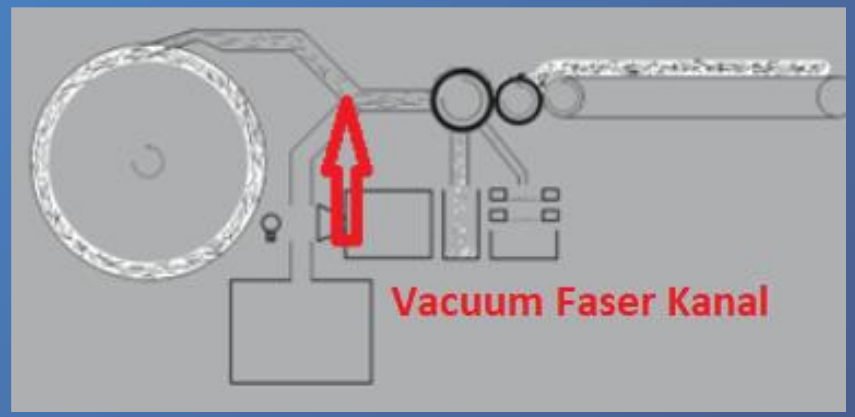
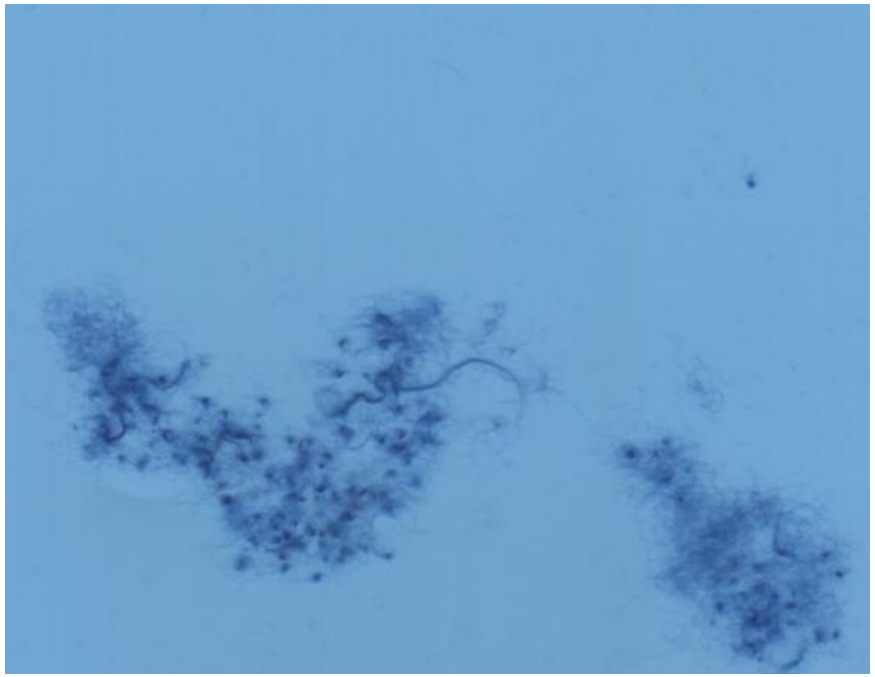
Neps testing on recycled fibres – Approach :



Schematic of MDTA 4

- *With the MDTA 4 with ROTORING, a sliver is formed for subsequent tests. During this first run, the remaining yarn pieces are separated from the clean fibres and neps.*
- *The ROTORING sliver, that was created during the first run on the MDTA 4, is then guided through the MDTA 4 again (second run), to separate the neps from the clean fibres. The results can be seen below:*



- *There are only few pieces of yarn and some clean fibers left, but in particular the neps are very easy to see.*
- *Now the number of neps is counted and the diameter measured using the NT-DA (digital image processing) module.*

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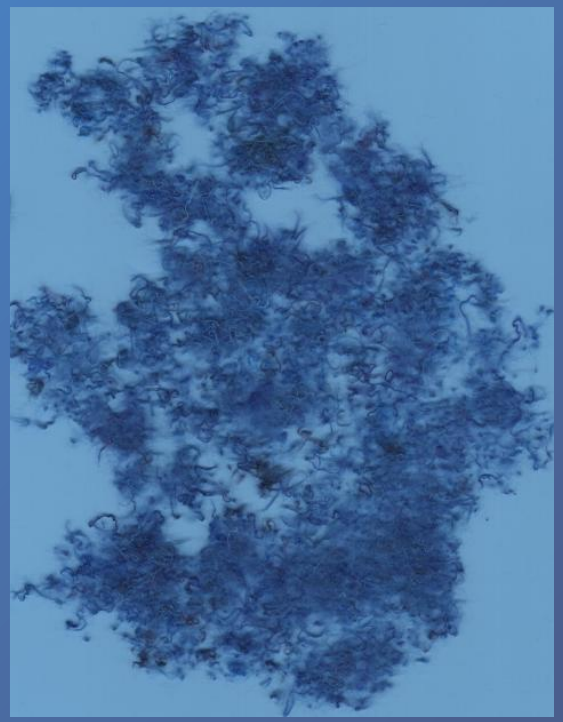
Sample A – remaining yarn pieces:



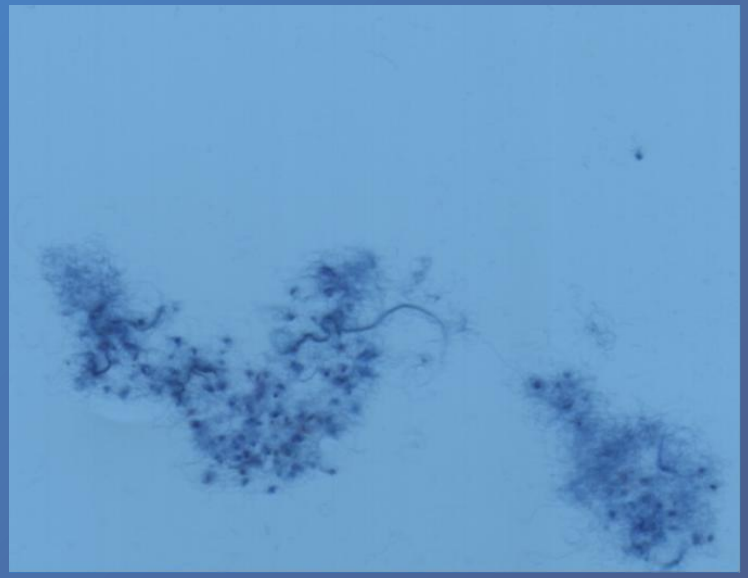
- *After the first run of the sample on MDTA 4, the remaining yarn pieces are separated from clean fibres, the results can be seen below:*

A) First run on MDTA 4 to measure percentage of yarn pieces:

Vacuum Fiber Channel : 1,5 mbar

No.	Weight yarn pieces / g	Fiber Fragments / g	Weight yarn pieces / %	Fiber Fragments / %
1	0,5679	0,0251	11,36	0,51
2	0,4778	0,0234	9,56	0,47
3	0,4891	0,0249	9,78	0,50
AVER.	0,5116	0,02447	10,23	0,49
SD	0,049	0,001	0,982	0,021
CV/%	9,594	3,798	9,595	4,220
MIN	0,4778	0,0234	9,56	0,47
MAX	0,5679	0,0251	11,36	0,51

Sample A – Neps quantity:



- *After testing the ROTORING sliver on the MDTA 4 (2nd run on MDTA 4), the results for neps testing can be seen below:*

B) Second run on MDTA 4 to measure th number of neps:

Vacuum Fiber channel now : 0,9 mbar

No.	Weight yarn pieces / g	Fiber Fragments / g	Weight yarn pieces / %	Fiber Fragments / %	NPS-Cnt QTY	NPS-Cnt QTY / g
1	0,0424	0,0192	0,85	0,38	4140	820
2	0,0465	0,0208	0.93	0,42	3996	799
3	0,0559	0,0212	1,03	0,42	5624	925
AVER.	0,0483	0,0204	0,94	0,41	4586,67	848,00
SD	0,007	0,001	0,550	0,023	901,238	67,506
CV/%	14,340	5,188	58,524	5,679	19,649	7,961
MIN	0,0424	0,0192	0,85	0,38	3996	799
MAX	0,0559	0,0212	1,03	0,42	5624	925

Sample B – remaining yarn pieces:

- *Sample B was then prepared for the first run through MDTA 4. The results for remaining yarn pieces can be seen below:*

A) First run on MDTA 4 to measure percentage of yarn pieces:

Vacuum Fiber Channel : 1,5 mbar

No.	Weight yarn pieces / g	ber Fragmen / g	Weight yarn pieces / %	Fiber Fragments / %
1	0,421	0,0137	8,42	0,27
2	0,4467	0,0159	8,93	0,32
3	0,4537	0,0167	9,07	0,33
AVER.	0,4405	0,0154	8,81	0,31
SD	0,017	0,002	0,342	0,032
CV/%	3,909	10,066	3,885	10,482
MIN	0,421	0,0137	8,42	0,27
MAX	0,4537	0,0167	9,07	0,33

Sample B – Neps quantity:

- *The generated ROTORING sliver is run over the MDTA 4 in a second pass. The results for neps testing can be seen below:*

B) Second run on MDTA 4 to measure the number of neps:

Vacuum Fiber channel now : 0,9 mbar

No.	Weight neps pieces / g	Fiber Fragments / g	Weight neps pieces / %	Fiber Fragments / %	NPS-Cnt QTY	NPS-Cnt QTY / g
1	0,0566	0,0133	1,13	0,27	7524	1505
2	0,0723	0,0106	1,45	0,21	10278	2056
3	0,0651	0,0137	1,31	0,27	8641	1728
AVER.	0,0647	0,0125	1,30	0,25	8814,33	1763,00
SD	0,008	0,002	0,160	0,035	1385,158	277,162
CV/%	12,153	13,454	12,371	13,856	15,715	15,721
MIN	0,0566	0,0106	1,13	0,21	7524	1505
MAX	0,0723	0,0137	1,45	0,27	10278	2056

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Test report of NTDA - Example:

- *The method has been improved to such an extent that 2 runs are still necessary on the MDTA 4, but only one evaluation is carried out using the NT-DA image processing software:*

TESTED Sample(s): 3

No.	Yarn pcs./%	Dust/%	F-Fragments/%	Np Cnt >.5/gr.	Np Cnt >.75/gr.	Np Cnt >1/gr.	Np Cnt/gr
1	0.95	0	0	78	14	6	99
2	0.68	0	0	139	26	10	174
3	1.17	0	0	141	22	8	171

	Yarn pcs./%	Dust/%	F-Fragments/%	Np Cnt >.5/gr.	Np Cnt >.75/gr.	Np Cnt >1/gr.	Np Cnt/gr
Mean	0.93	0	0	119.33	20.67	8.00	148.00
CV%	15.05	0	0	10.48	3.73	0	8.97
Dev	0.14	0	0	12.51	0.77	0	13.28
Max	1.17	0	0	141.00	26.00	10.00	174.00
Min	0.68	0	0	78.00	14.00	6.00	99.00
R	0.49	0	0	63.00	12.00	4.00	75.00

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Summary 1

The NTDA module consists of a high-resolution scanner and a special developed image processing software. The work steps are as follows:

1. Remove the contents of the trash box.

2. Weigh the contents with the high-resolution scale.

3. Place the contents of the trash box on the scanner and start the test…..

Calculation

No.	NL Content	Dust / gr.	F-Fragments / gr.	Np Cnt >.5	Np Cnt >.75	Np Cnt >1	Np Cnt	Np Cnt/gr
1	1.13	0	0.27	6840	576	108	7524	1505
2	1.45	0	0.21	9126	864	288	10278	2056
3	1.3	0	0.27	7542	792	306	8640	1728

When scanning the image and counting, the neps are divided into 3 size classes:

A) nep size between 0.5 mm - 0.75 mm

B) nep size between 0.75 mm - 1.0 mm

C) nep size over 1 mm

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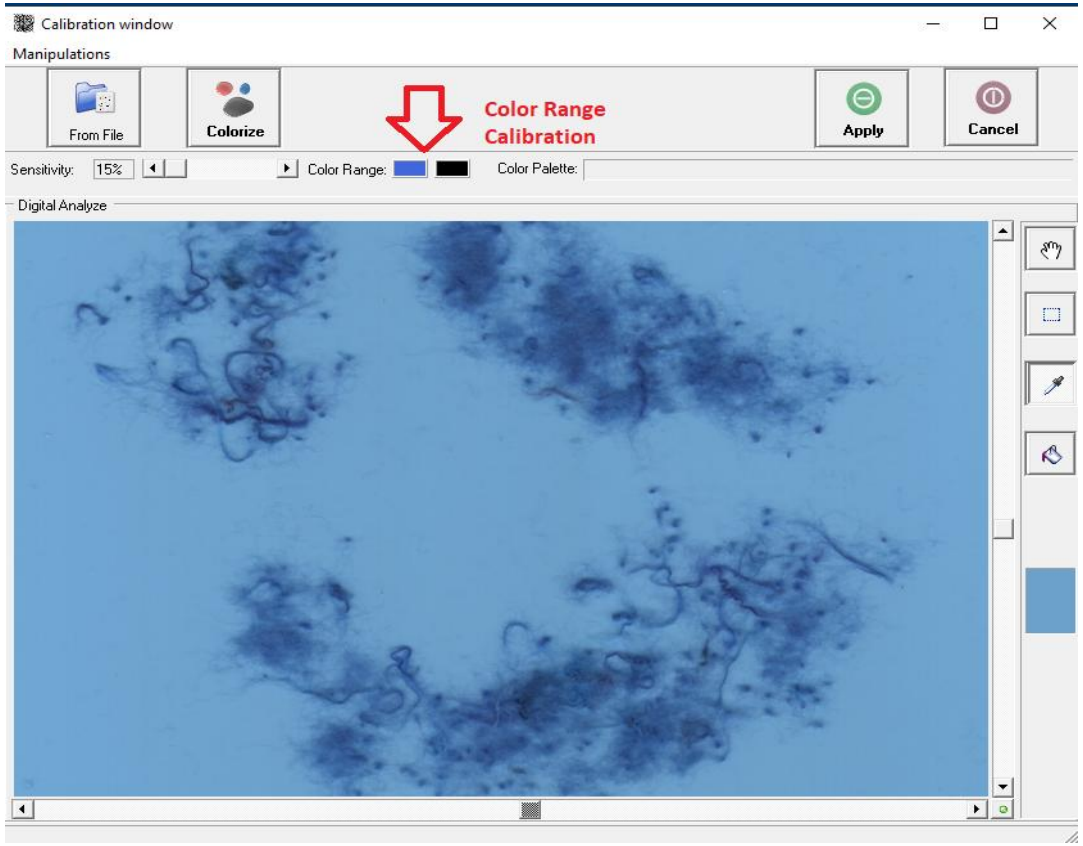
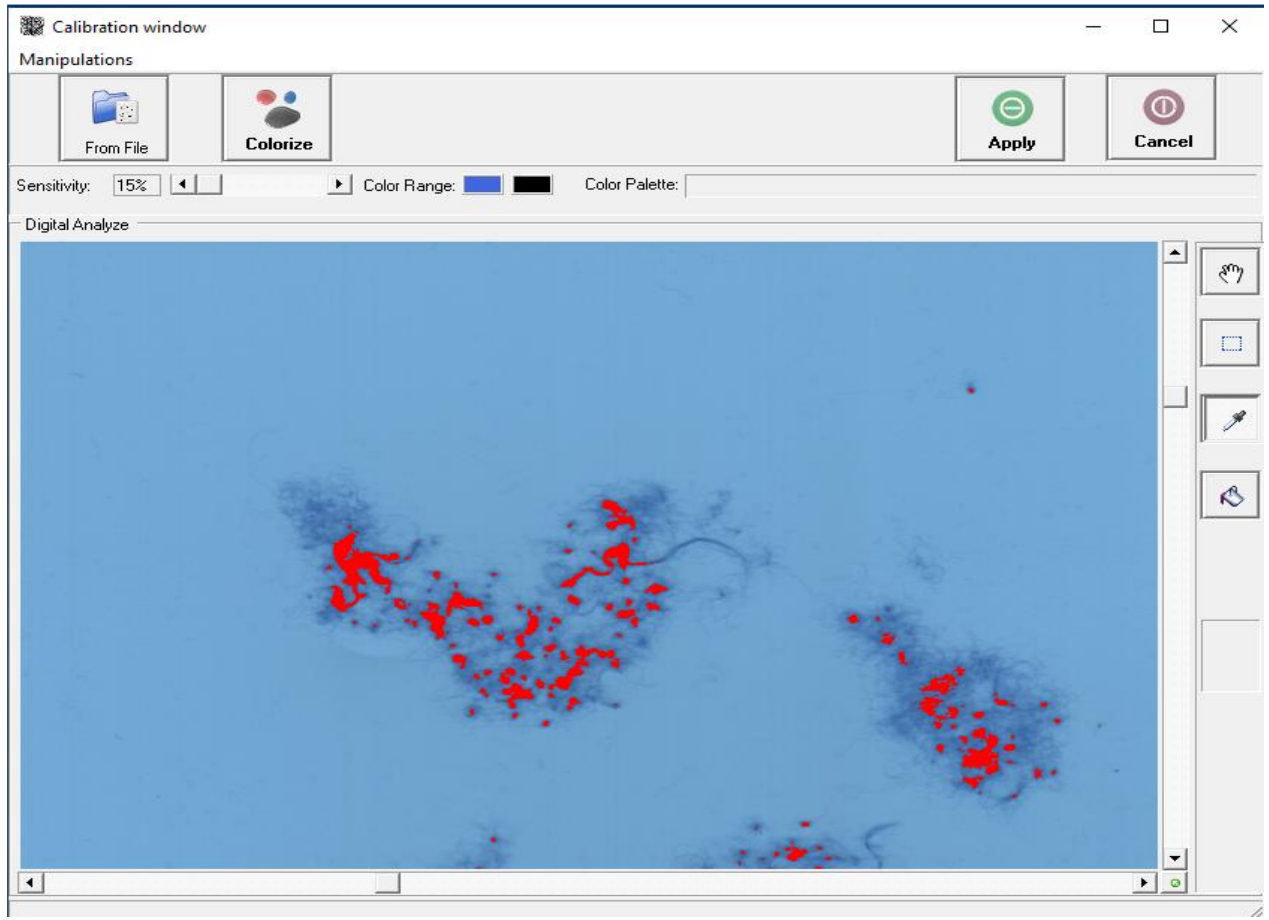
Summary 2

- *The evaluation with the NT-DA module requires special TEST METHODS to count and classify the size of the neps.*
- *The TEST METHOD used are adapted to the color palette of the recycled fibers (see image below).*



Summary 3

- *There is a function within the software to calibrate the colors: To check, that the color range of a sample is correctly calibrated, the COLORS button can be used: pressing this button will highlight the parts in the image that are detected for the calibrated color range!*



FCS stations - parameters to be measured:

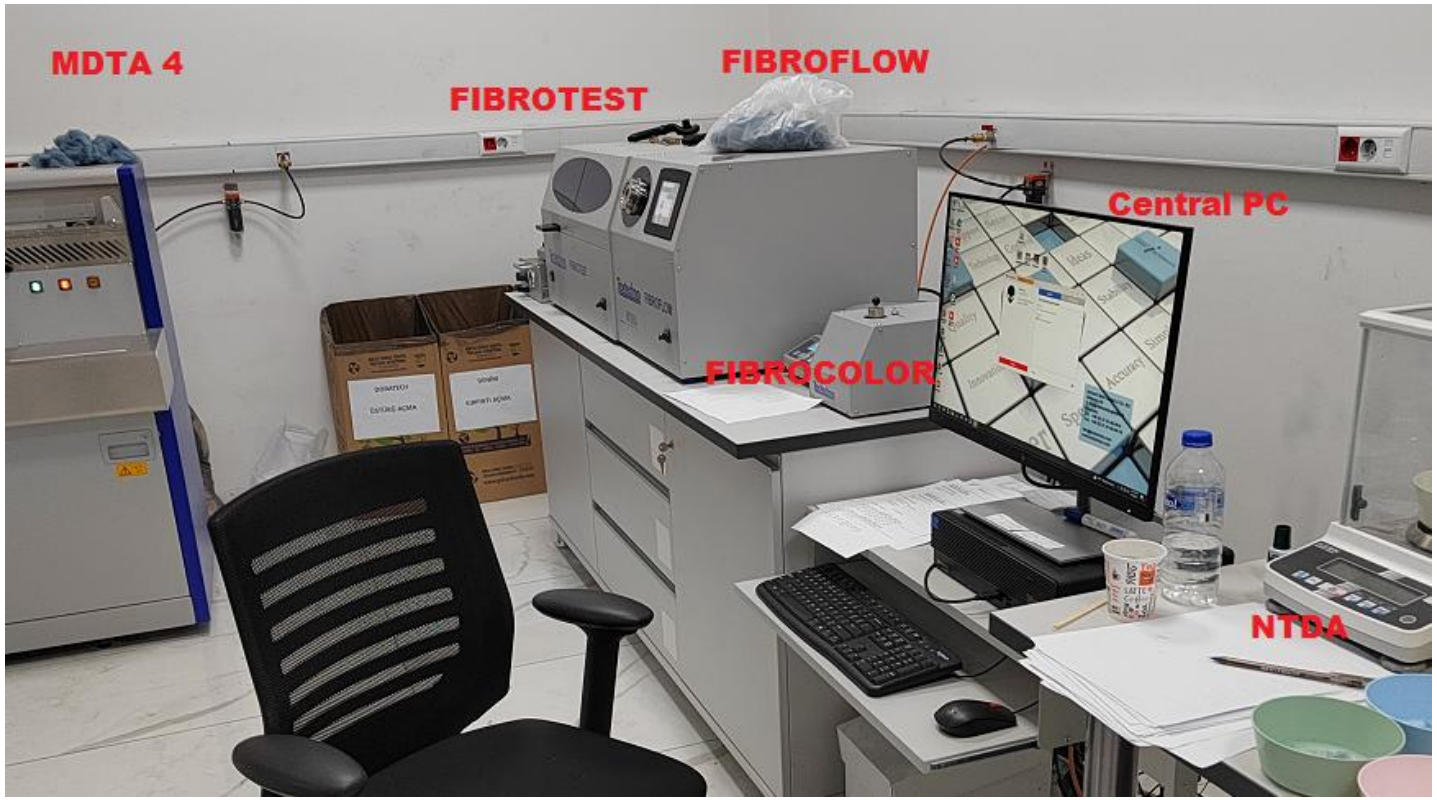
MDTA 4 and NT-DA module: percent yarn pieces, nep count

FIBROFLOW: Micronaire value, fiber fineness

FIBROTEST: Fiber length distribution, fiber bundle strength

FIBROCOLOR color of the fibers (color sorting)

- *Special version of the TEXTECHNO FCS Version 5 in TURKEY, adapted to testing of recycled fibers, with MDTA 4, FIBROTEST, FIBROFLOW, FIBROCOLOR, NT-DA module and central PC*



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Thank you!

FIBROTEST:
Fibre length and bundle strength (absolute)

FIBROFLOW:
Micronaire and maturity (double compression)

OPTOTEST:
Trash analysis and colour grade

MDTA 4:
Trash separation, opening work, sliver generation, neps testing

made in Germany