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ACCURATE TRASH MEASUREMENT AND ITS SIGNIFICANCE IN COTTON CHAIN

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Value of an Accurate Trash Measurement in Cotton Chain : **GINNING**

- A typical ginning practice in removing trash from lint can result in over drying and excess cleaning. This practice can also result in fiber damage and excess good fiber loss.

- Knowledge of accurate cotton's trash content will assist in optimization of pre cleaning and lint cleaning equipment in efficient removal of trash to reach target sales price and to retain fiber quality.

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Value of an Accurate Trash Measurement in Cotton Chain : **CLASSING**

Today, majority of world's cotton is tested by instruments which is increasing annually.

The reasons are three fold:

- Higher number of measured properties compared to human classing
- More accurate measurements
- Higher testing throughput

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Value of an Accurate Trash Measurement in Cotton Chain : **SPINNING**

- The accurate measurement of trash content in cotton is of importance because it determines the trash removal in the blow-room , carding and combing processes.
- Inaccurate data affects the raw material cost through loss of fiber yield in the trash removal and negates the ability to negotiate a fair market price based on the level of trash in the purchased bale of cotton.

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Value of an Accurate Trash Measurement in Cotton Chain : **SPINNING and Weaving**

- Additional impact on spinning is in the form of quality and performance cost. Trash particles cause sub par yarn quality as the result of end breaks and subsequent piecing and yarn defects.
- Operation efficiency is impacted due to higher down times.
- The negative impact continues thru the following processes in weaving.

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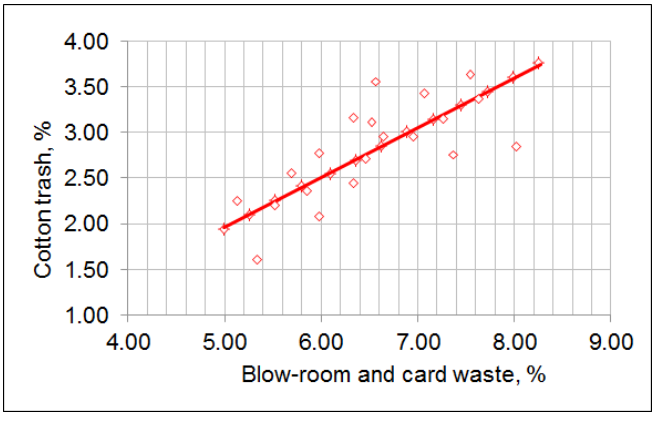
Application: Known information about impact of trash on spinning and weaving performance



Effect of % cotton trash on amount of blow room and card waste removed.

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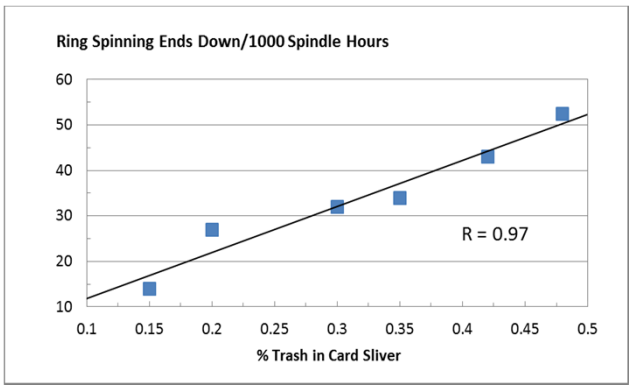

The relationship between percent trash in card sliver and the number of ends down at ring spinning (From book "Short Staple Yarn Manufacturing" McCreight, Feil, Booterbaugh, &Backe, Carolina Academic Press, p.99.).

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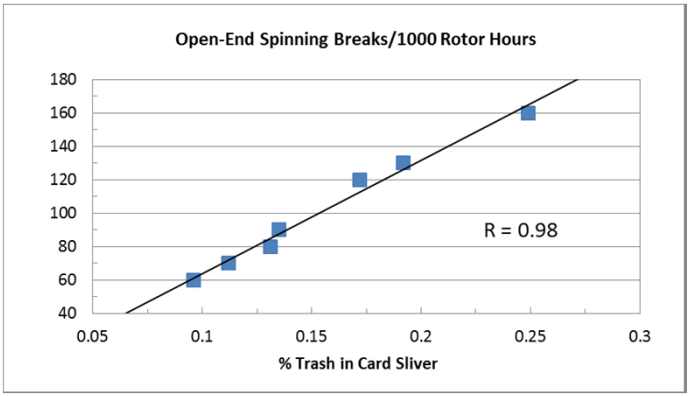

The relationship between percent trash in card sliver and the number of spinning breaks per 1000 rotor hours. (From "Trash Content of Card Slivers Related to the Frequency of Broken Ends in Rotor Spinning." by Artzt, Azarschab, & Maidel, Texil-praxis International, 45(11), p.1146.)

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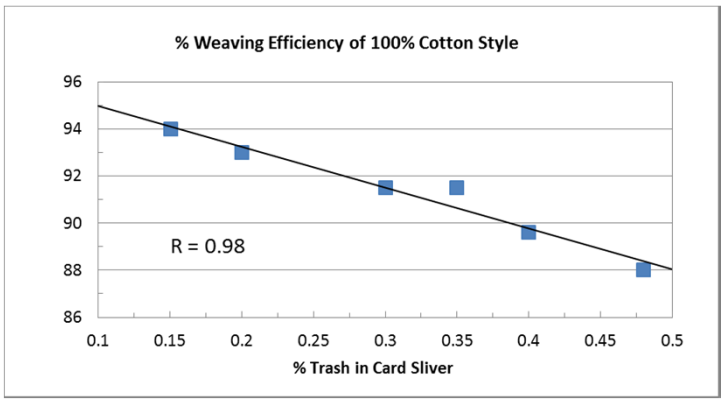

The relationship between percent trash in card sliver and yarn performance at weaving (From book "Short Staple Yarn Manufacturing" McCreight, Feil, Booterbaugh, &Backe, Carolina Academic Press, p.100.)

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Status of Current Instruments Methodology and Performance

Direct Measurement:

- Trash is separated from fiber using mechanical means
- Trash is collected and weighed on a scale
- Trash is reported as a percent of total sample weight.
- Current instruments are generally based on antiquated technologies, have long cycle times, and data that are highly influenced by operator.

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Status of Current Instruments Methodology and Performance

Indirect Measurement:

- Electro-optical and imaging technologies used in instruments such as AFIS and HVI
- AFIS: Successful implementation in applications such as textile mill processing.
- HVI: Successful implementation in some mills and classing application such as USA and Australia.

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The Needs for Direct Trash Measurement

- There is a need in some markets for a direct measurement of this fiber quality without the shortcomings of the current instruments.
- Examples are:
  - China classing operation
  - Markets that wish to trade cotton based on the accurate weight of trash in the bale cotton.

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Uster GT1000 Trashmeter Design Objectives

- Trash measurement must be gravimetric based.
- This measurement must be more accurate than existing instruments on the market.
- This instrument must have a fast cycle time making it practical in classing or high volume applications.

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Uster GT1000 Technical Performance

- High degree of accuracy utilizing patented technologies for mechanical and air flow design
- High trash-fiber separation efficiency of greater than 90% with a single pass.
- Application of a high resolution camera with special imaging algorithms to further increase the accuracy of measurement.
- High degree of automation with no intervention by the operator in weighing and discarding trash.

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Technical Performance

- High speed testing with a cycle time of 60-90 seconds for a 30 gram sample
- High precision with test results repeatability & reproducibility among three instruments over a 30 day period with SD of 0.35% & CV of 6.5%
- No operator independency with R^2=0.99 comparing two operator results versus the third
- Ability to test a wide range of menu selectable materials such as saw ginned, roller ginned, card mat, card sliver, gin waste and spinning process waste

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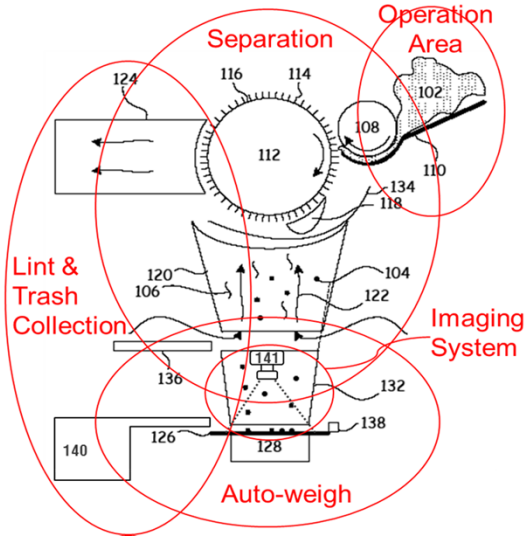
GT1000 Functional Diagram



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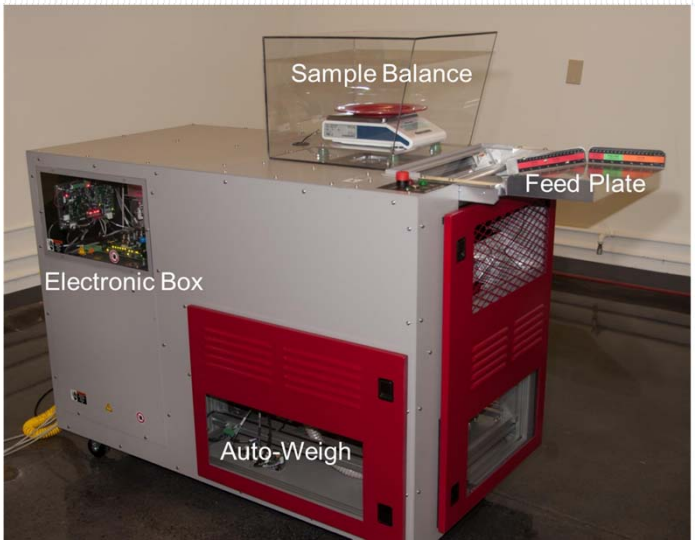
GT1000



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Sample with 3.0% Trash Content

Sample before trash removal

Cleaned lint

Removed trash

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Sample with 4.5% Trash Content

Sample before trash removal

Cleaned lint

Removed trash

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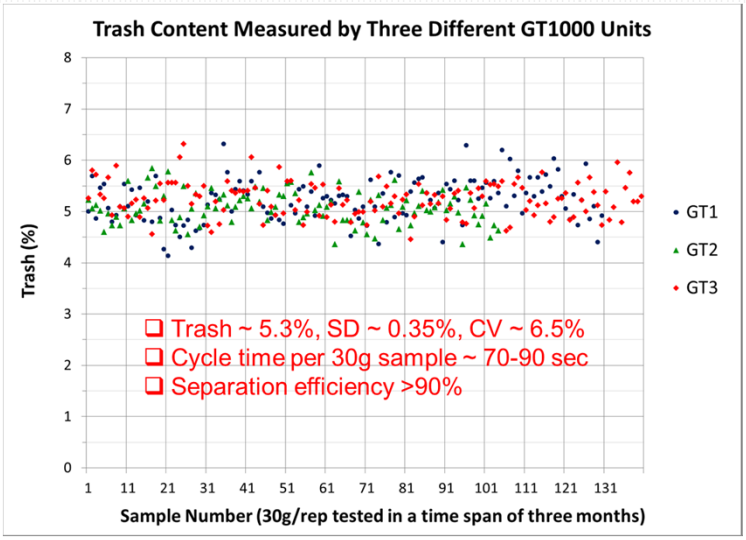
The Performance of Three GT1000 over a period of three months



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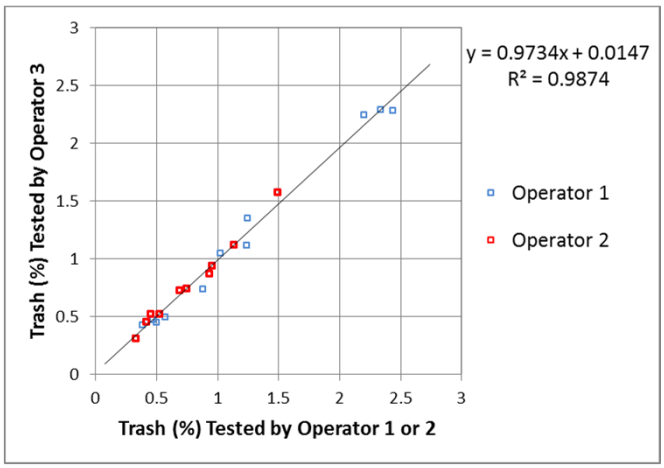
Reproducibility among Different Operators: *Data are Operator Independent and Objective*



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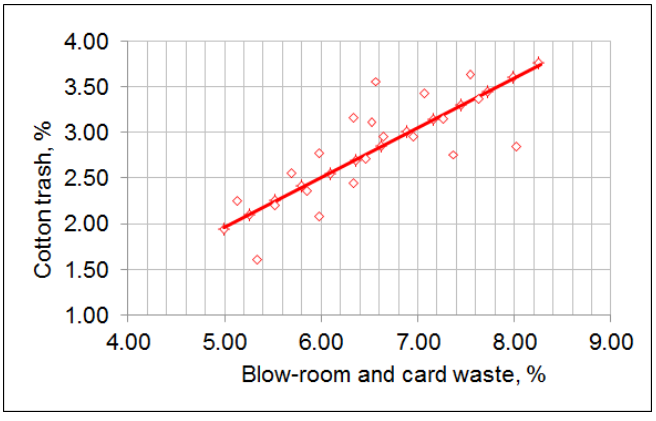
Application: Known information about impact of trash on spinning and weaving performance



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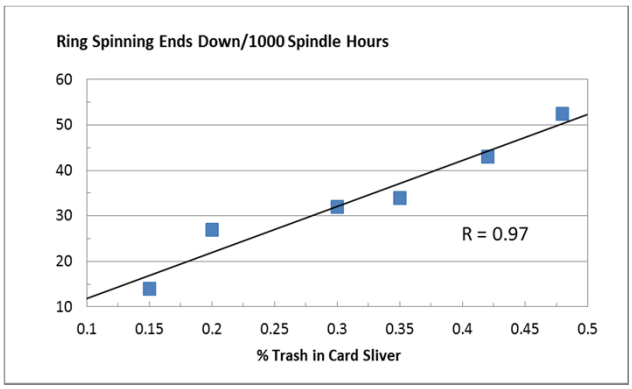

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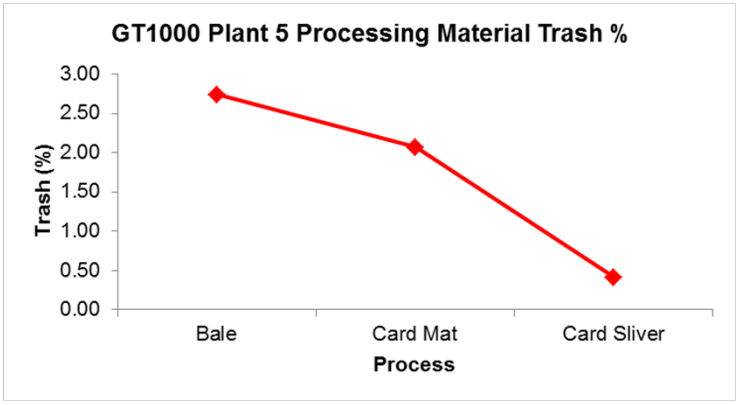

GT1000 measurement of Trash % in spinning mill processing material.

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Application: Performance of GT1000 in Classing and Spinning trials

GT1000 test results for each process material tested

Bale ID:	100%	Cotton	
Comment:	Plant 5	(Bale)	
Rep	Sample [g]	Trash [g]	Trash [%]
1	30.74	0.78	2.54
2	29.88	0.79	2.64
3	30.45	0.92	3.03
Avg	30.36	0.83	2.74
SD	0.44	0.08	0.26
CV	1.44	9.54	9.43

Bale ID:	100%	Cotton	Card
Comment:	Plant 5		(Mat)
Rep	Sample [g]	Trash [g]	Trash [%]
1	30.31	0.61	2.03
2	30.25	0.57	1.88
3	29.7	0.68	2.29
Avg	30.09	0.62	2.07
SD	0.34	0.06	0.21
CV	1.12	8.91	9.95

Bale ID:	100%	Cotton	(Card
Comment:	Plant 5		(Sliver)
Rep	Sample [g]	Trash [g]	Trash [%]
1	30.55	0.13	0.44
2	30.53	0.12	0.39
3	30.97	0.12	0.39
Avg	30.68	0.12	0.41
SD	0.25	0.01	0.03
CV	0.81	6.48	6.9

Each material was tested by same operator on same instrument following a 30 gram per repetition, 3 repetition test protocol for each process material. The results of these tests in above tables demonstrate good CV's at below 10%.

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Conclusions and Remarks:

- These published data are the result of GT1000's evaluation by a classing operation, in-mill study, and a research laboratory.
- As part of an overall assessment of this instrument, it also successfully completed the requirements for CE certification.
- We are of the belief that GT1000 addresses the needs of cotton trade, classing operations, and textile mills for an accurate and fast trash measurement which has been reiterated in multiple international forums.

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