SEMITRONIK

COTTON CONTAMINATION ANALYSER

DEVELOPED UNDER SPONSORSHIP OF MINISTRY OF INFORMATION TECHNOLOGY, GOVERNMENT OF INDIA

SYSTEM DESCRIPTION

HARDWARE

System configuration of
Cotton Contamination Analyser consists of :

i. Web Preparatory Device (Micro card)
ii. CCD Cameras
iii. Light Source
iv. Weighing Device
v. Image Analyzing System

WEB PREPARATORY DEVICE (MICRO CARD)

To identify contamination in terms of their size and number of the cotton tufts are required as under :

- To open cotton fibrous tufts and individualize the cotton fibres.
- To carry the impurities along with the web.
- To form a thin uniform layer of cotton fibres and impurities both together (cotton fibrous web).

The outcoming web is passing over a clear flat glass arranged at an angle and then falls freely on the weighing pan. Behind the glass plate a uniform light source is arranged. Just above this light source, two CCD cameras are mounted side by side to capture the images of the web.

CCD CAMERA

Two high resolution CCD cameras are used to capture the images of the cotton web.

LIGHT SOURCE

To get uniform illumination, 12 halogen bulbs were fitted in two rows.

WEIGHING DEVICE

The web which is scanned by camera is weighed by the weighing balance and data is transferred to imaging system through serial port.

IMAGING SYSTEM

Imaging system consisting of :

a) Pentium system.
b) Video frame grabber.

SOFTWARE

Particle of size 0.2 mm or above to be detected.

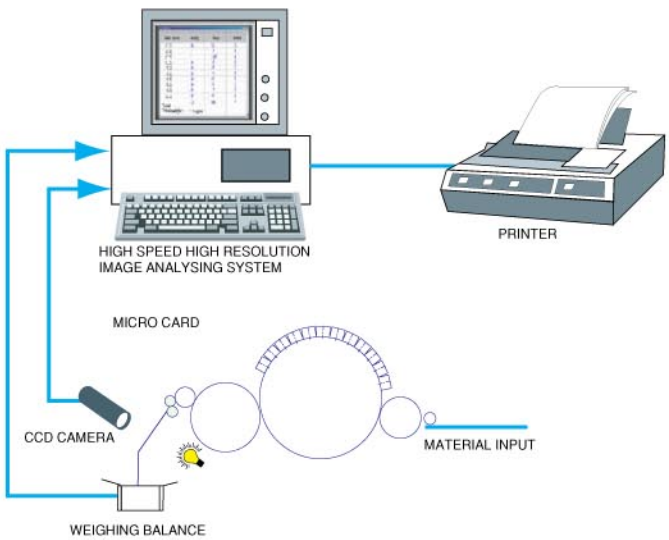
PROCESSING SOFTWARE

- Seed-coat fragment is classified having centroid with outer bulb.
- Neps and leafy matters are classified comparing their grey level limits.
- Nep grey level is greater than leafy matter.

Microsoft C++ is used under windows 95 easy to operate menu driven software. Processing software based on above algorithms to display live moving web, analyze in terms of their type and size, generate the reports in tabular and graphical form.

TECHNICAL DATA

- Electrical operating system : Evaluation time. Environment needed.
- Tests for the most problematic contaminants in the textile industry today : Neps Trash Seed coat fragments Stickiness.



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COTTON CONTAMINATION ANALYSER

In the last decade of yarn production, Cotton Contamination has became a major problem because of the greatly increased use of high-speed spinning machines, which require high-quality cotton, especially with regard to neps, trash, seed-coat fragments and stickiness.

Fire neps, trash particles and seed-coat fragments are visible foreign matter in cotton fibre. These foreign matter in the raw cotton influence yarn quality, the running characteristics of the spinning machines, dyeability and hence also the quality of the woven or knitted fabric. The improved blowroom machinery and cards play a key role in the efforts to reduce the quantity of undesirable particles in cotton. However, this requires detailed information on the type, size and number of such particles. The digital image processing has made it possible to distinguish between fibre neps, trash and speed-coat fragments.

In the case of jute industry, digital imaging can help in grading of jute fibres. The main criteria that determine the classification of fibres are length of head, strength, colour lustre, cleanliness and general freedom from rating defects. All the parameters except strength can be measured by using digital imaging. However, the strength can also be indirectly assessed by the measurement of lustre because a high lustre is generally associated with good strength.

In the Cotton Contamination Analyser, specially designed micro card which converts the raw cotton into thin uniform web without removing any impurities, is scanned by CCD camera and processed by imaging system to classify undesirable particles in terms of their size and number. The analyser will provide help to spinning experts, machinery manufacturers and cotton specialists to precisely determine the quantities and type of undesirable particles contained in the cotton.

These information will provide vital feedback in upgrading cotton material, efficiency and quality of blowroom and carding processes.

The other methods used to measure contaminations in cotton can be roughly categorized as follows :

- Manual visual inspection.
- Gravimetric mechanical method.
- Electro-optical method.

The first method is very subjective, costly and time consuming. The second method allows to determine the overall volume of the impurities contained providing quantitative analysis, but does not classify the particles in terms of their type. It also does not provide any information for fibre neps. The third method is used in HVI testers which rapidly determine the trash content on the surface of a cotton tuft minimizing the subjectivity, but does not classify particles in terms of size and type. Special evaluation modules are available which work on electro-optical principle, measure the trash content and fibrous neps and classify according to their size. However, trash contents cannot be classified into various types.

Cotton is converted into a thin uniform web form which is scanned by CCD camera under proper lighting condition. Images are transferred to imaging system, which counts the particles and analyses in terms of their types and sizes. Images captured by CCD camera are processed by computer-aided image processing system using fixed analysis algorithms based on following aspects :

- To classify particles in terms of their types i.e. fibrous neps, seed coat fragments and trash particles.
- To classify particles in terms of their sizes.
- To test longer length for better statistical data.
- Easy to operate and user friendly.

COTTON CONTAMINATION ANALYSER

BENEFITS

High speed system	: High speed detection for mass testing.
Detects a range of contaminants at the same time	: Neps, trash, seed coat fragments and stickiness.
Sensitive and accurate	: Sees tiny sticky deposits that are not visible to the naked eye.
Differentiates between pepper trash and seed coat fragments	: The only tester that makes this differentiation optically and not mechanically.
Detection and evaluation according to amount and size	: Detection sizes can be programmed according to customer's needs.
Substantially improved statistics	: Due to longer mass of each sample web statistical data per bale/sample content is improved over other testing systems.
Versatile installation and use	: Can be used in various locations within the textile and cotton industry.
Easy to operate	: Switch-on insert sample and follow the computer instructions.
Fully computerized and internally controlled system	: Customer sets the parameters of the system and then it follows through automatically.
Very easy man-machine interface (MMI)	: User-friendly operation.
Summary of data reported on-the-spot	: Data is accumulated and detected per sample or group of samples in real-time on screen on disk and/or in printed form.
Modular design	: The customer can purchase the non sticky contaminants module and later, up-grade the system to include the stickiness module.
Short set-up time	: Plug-in, calibrate and the system is ready for the first sample.
Scientific advantages and possibilities	: Testing of the contaminants is carried out at the same time within one machine. This enables very interesting future scientific correlation regarding these contaminants and paves the way to better understand how to produce better yarn.

Manufactured under licence from Ahmedabad Textile Industry's Research Association (ATIRA)

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