The fast H2SD detector used to count honeydew deposits on cotton fibers

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A rapid detector for a bale-by-bale determination

Cotton stickiness level has become a major selective criterion for cotton fiber quality.

It is important, both for productors and spinners, to know the stickiness of each bale produced. Producers could sell the uncontaminated cotton at a higher price and spinners could thus reduce the negative effects of stickiness on machines (photo 1) and on yarn quality (Hequet and Frydrych, 1992), using appropriate means such as mixing cottons or decreasing the relative humidity of the mill.

Photos R. Frydych

Photo 1. Honeydew causes disruption during carding.

Establishing the stickiness of each bale requires a machine capable of rapidly measuring stickiness. CIRAD has developped a machine capable of measuring stickiness far more rapidly than the SCT thermodetector, recommanded by the international textile manufacturers or ITMF. This is the H2SD (high speed stickiness detector, photos 2 and 3) manufactured in partnership with SDL International, United-Kingdom.

Photo 2. H2SD high speed stickiness detector.

Photo 3. H2SD with open doors.

Stickiness measured by H2SD

The analysis is performed at 65% relative humidity and 20°C.

The H2SD (Frydrych *et al.*, 1994) is made up of five work stations (figure 1): a sample of cotton (3 to 3.5 grams) is opened using a rotor (1) to form a pad; this is placed on an aluminium foil which passes successively in front of 4 stations.

Hot pressure (2) is applied to the sample. The sticky points in contact with the aluminium foil are fixed in place by pressure exerted at ambient temperature (3).

The cotton is then removed (4), the number of sticky points are counted by an image analyzer (5) and their size determined.

These stations are independent. Four samples are processed simultaneously. The machine is able to analyze a sample every 30 seconds.

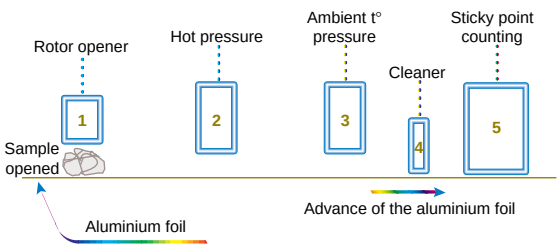

Figure 1. H2SD principle: five works stations.

H2SD results correlate well with those given by the reference apparatus

The results provided by the thermodetector correlated well, r = 0.92, with those from the H2SD (figure 2). The data were converted into square root values to meet the conditions required for linear regression.

A good prediction of the relation between H2SD counts and SCT counts can be proposed as follows:
SQR (H2SD) = 7.25 * log [SQR (SCT) + 1] – 0.38 ; r = 0.92

An excellent correlation, r = 0.94, was noted between two tests (figure 3) on 87 cotton samples (3 repetitions).

The results of the two tests were close to being equal. A statistical analysis showed that the 0.94 slope of the regression line was not different from 1 and that the intercept at the origin (0.15) was not different from 0. This shows the high reproducibility of the method.

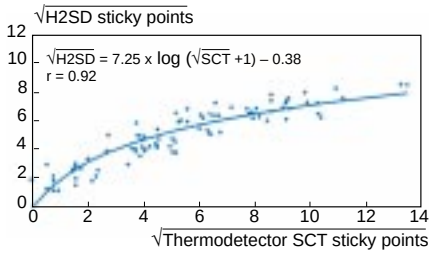

Figure 2. SCT thermodetector vs H2SD on 87 cottons from different countries (mean of 3 repetitions).

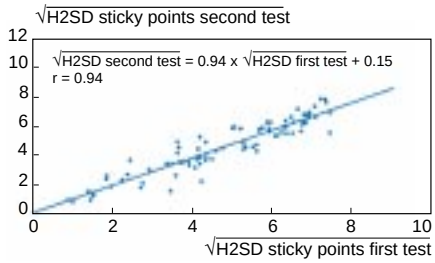

Figure 3. Relationship between 2 tests results with the H2SD on 87 cottons (mean of 3 repetitions).

Conclusion

Like the thermodetector, the high-speed H2SD gives quantitative results.

As the H2SD is entirely automated, it presents several advantages: it is fast as it gives a result every 30 seconds; no operator effect is involved as the operator's role is reduced to feeding the machine; the sticky points are counted and sized by an image analyzer; the results obtained with the H2SD correlate well with those given by the apparatus currently recommended by the ITMF, the SCT thermodetector.

References

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