

ADDITIONAL FIBER MEASUREMENTS BEING EVALUATED

H. H. Ramey, Jr.

Cotton Division, AMS, USDA

Memphis, Tennessee

Introduction

The High Volume Instrument (HVI) Systems currently being used in the classification of cotton samples for marketing purposes make seven fiber property measurements: (1) fiber length, (2) fiber length uniformity, (3) fiber strength, (4) micronaire reading, (5) percent area of trash, (6) reflectance (Rd) and (7) yellowness (+b). Additional measurements of fiber properties are proposed from time to time. These are reviewed by the Cotton Division and new tests for use in the marketing system.

Evaluation Criteria

Measurements of the classification system by HVI must meet six criteria. The measurement must: (1) be meaningful, (2) have sufficient speed, (3) be reproducible, (4) have a procedure for calibrating speed, (3) be reproducible, (4) have a procedure for calibrating many systems to a common level, (5) be reliable and (6) be economically feasible. A proposed Measurement of usually evaluated by these criteria in the order given.

First, any measurement used in the marketing system must provide meaningful information about the fibers that influence their subsequent use. Each of the seven measurements listed above affects either process ability or utility and these are meaningful to manufacturers or utility and these are meaningful to manufacturers.

Length and micronaire affect process ability and the product that can be made from the fiber. Length uniformity and trash affect process ability. Fiber strength affects yarn strength. Reflectance and yellowness affect the product that can be made. Any new measurement must provide information about the fiber that is useful to the industry.

Second, any measurement added to the system must have a speed compatible with the current HVI systems. If the measurement cannot be made in the time frame of the measurements currently being made, it cannot be added to the system. Complete tests of each of the above seven measurements can be made in less than 25 seconds. Any new measurement to be added to the system must be able to produce a complete test within the 25 second time frame.

Third, the results of the measurement must be reproducible. The most commonly used indicator of the variability of a measurement is the standard deviation. However, when comparing different measurements of measurements systems, the coefficient of variability (CV) is used to assess the reproducibility of a measurement. CV is the standard deviation of the test divided by the mean of the property expressed as a percentage. For example, cotton fiber strength measurement has a strength of 28 grams/tex, the CV is 3.9 percent.

Fourth, there must be a procedure for readily calibrating many instruments to a common test level. If more than one instrument is used for testing, whether in the same laboratory or at some distant location, the instruments must be brought to the same test results level. Otherwise, communication in the marketplace is hampered. When an offer is made on the basis of the test level in one laboratory and is accepted with the understanding of the test level of another laboratory, disagreements can arise rapidly. The ability to calibrate instruments to a common level is essential for orderly marketing.

Fifth, the test apparatus must be reliable. An otherwise acceptable measurement that is constantly needing repair and maintenance can not be used in the classification of cotton samples. Minimum downtime is a must for any measurement used to classify cotton samples.

Finally, the test must be economically feasible. A test that meets the first five criteria but is exceedingly more expensive would not readily be accepted by the industry.

Tests That Have Been Proposed

The addition of a sugar and/or stickiness measurement to the system would have widespread support. Sugar content measurement by the wet chemistry procedure is too slow and inaccurate to be considered. It fails the speed and reproducibility criteria. Laboratory to laboratory reproducibility of the Thermodetector test is not up to expectations. New tests for sugar and stickiness are under development. A high speed stickiness detector has been developed and preliminary evaluations are being carried out by research groups. Reports of these evaluations will determine what actions of the Cotton Division will take on this instrument. Another stickiness measurement is based on an apparatus that is bulky and costly. The costs for its use may be excessive for routine testing. However, reports of preliminary evaluations of this instrument will be considered.

Interest has been expressed in the elongation-to-break measurement of fiber bundles. The CV of the elongation measurement of the Stelometer, a laboratory instrument, is in excess of 12 percent. An HVI elongation measurement would have to have the CV dramatically reduced from this level in order to meet the reproducibility criterion. In addition, the elongation measurement does not have a procedure for

insuring that each instrument is on the same level. At present, the measurement fails the calibration criterion in addition to the reproducibility criterion.

The textile manufacturers have asked for a short fiber content measurement. One such measurement was developed for HVI instruments a few years ago. Short fiber content measurements were made on a series of cotton samples with a Cotton Division instrument and a Cotton Incorporated instrument. Each instrument produced results that were the other instrument. There was no procedure to bring the test levels together. Because of the lack of a calibration procedure, the measurement was not explored further.

Tests Under Evaluation

A new short fiber content measurement for use on HVI systems was recently made available to the Cotton Division by Zellweger Uster. Since the textile manufacturers have asked for a short fiber content measurement, it is assumed that this measurement will provide useful additional information about cotton fibers and, therefore, will meet the criterion for being meaningful. Indicate that it is sufficiently fast to meet the speed criterion. The measurement has been installed in six lines in the Cotton Division's Memphis offices. Special studies are being conducted to gain a preliminary look at the reproducibility, reliability and calibration criteria. Preliminary results are favorable, but additional evaluations will be done before making recommendations to the industry in this short fiber content measurement.

Summary

The short fiber content measurement is the only new test currently under active

evaluation. Attention is being given to improvements in the current measures and such improvements will be evaluated when made. Reports of new test methods and procedures by ARS, Cotton Incorporated, International Textile Center and industry groups are carefully considered. As new measurements are developed, they will be evaluated by the criteria outlined above.