

## **INTERNATIONAL DEVELOPMENTS IN COTTON CLASSIFICATION**

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### **Abstract**

Since 1991, the USDA has successfully provided instrument based cotton classification to U.S. cotton producers. The success of the U.S. cotton classification system has prompted many other countries around the world to develop similar systems. Countries including Uzbekistan, China, Brazil and Australia are rapidly moving toward their own versions of instrument based cotton classification systems capable of providing total crop classification. The USDA, AMS, Cotton Program is working on several international initiatives to promote international standardization of instrument based cotton classification. Given its years of experience in instrument classification, the USDA is strongly promoting the utilization of methods and standards that are established and accepted by the USDA, the U.S. cotton industry and the 21 countries that are signatory to the USDA's Universal Cotton Standards Agreement.

### **Introduction**

The U.S. cotton industry's success with instrument based cotton classification is encouraging cotton producing countries around the world to begin transitioning from manual to instrument classification. The international cotton industry is realizing that in order to remain competitive with synthetic fibers, instrument classification of cotton must eventually replace traditional manual methods as the primary means of assessing cotton quality. The detailed fiber quality information provided by instrument classification is essential for ensuring that mills are able to select bales that meet precise laydown specifications. Today's tight profit margins do not allow mills to over or under buy cotton bale quality. Since USDA's 1991 implementation of instrument classification on all U.S. grown cottons, the U.S. cotton production industry and its customers have benefited from the ability to have detailed quality information on practically every bale of U.S. grown cotton.

Universal standardization in instrument testing is essential if instrument classification is to be successful on an international basis. The USDA is actively working with the international cotton industry to establish standards and procedures for instrument classification that will be recognized and used by all countries that grow, market and process cotton. With thirty plus years of instrument based cotton classification experience, the USDA is contributing its expertise in the standardization effort. The USDA is actively involved in the organized efforts toward international standardization by the International Cotton Advisory Committee (ICAC), the International Textile Manufacturers Federation (ITMF) and the Universal Cotton Standards Advisory Committee. In addition, the USDA is working with classing organizations in China, West Africa and other countries to develop classification systems that are moving away from manual classification methods. Promotion of instrument classification and standardization is also being achieved through the efforts of Cotton Incorporated's Engineered Fiber Selection (EFS) System.

### **Brief History of USDA Cotton Classification**

The USDA has played a major role in raw cotton quality classification since 1909. It all began for the USDA in 1907 when the International Cotton Congress, made up of cotton industry representatives from Europe and the United States asked the U.S. government to establish cotton standards that could be used throughout the cotton industry. In 1908, the U.S. government responded by passing legislation that authorized the USDA to establish cotton standards and to offer cotton classification services. In 1909, the USDA established its first set of grade standards. Since these early beginnings, USDA cotton classification has evolved from the basic manual classifications of grade and staple length to multi-measurement instrument based classification.

The USDA began researching the possibilities of instrument based classification in the late 1960's. By the mid 1970's, instrument classification was being actively evaluated in a few USDA classing offices. In 1980, the first fully instrument equipped USDA classing office went into operation in Lamesa, Texas with ten High Volume Instruments (HVI). Throughout the 1980's, more and more classing offices were equipped with instruments. By 1991, all classing offices had become fully HVI equipped. As a result, beginning with the 1991 crop and continuing

through today, practically all U.S. grown cotton is instrument classed. With an average crop size of 17 million bales per year, the total number of U.S. cotton bales classed by USDA instruments since 1991 is over 200 million.

The Universal Cotton Standards Agreement was established by the USDA in 1923 to provide universally accepted cotton classification standards. For many years the Agreement provided manual grade and staple standards to the U.S. cotton industry and foreign cotton associations around the world. Given USDA's full scale adoption of instrument classification in 1991, the Universal Cotton Standards agreement was expanded to begin including standards for instrument based cotton classification. In 1995, cotton calibration standards and standard laboratory atmosphere conditions for High Volume Instrument (HVI) testing were added to the Agreement. In 2002, USDA instrument procedures in addition to micronaire calibration cottons were adopted. In 2005, instrument standards for color Rd and +b will be considered for addition to the Agreement.

### **ICAC Expert Panel on Instrument Standardization**

In 2003, the International Cotton Advisory Committee (ICAC) established an Expert Panel on Commercial Standardization of Instrument Testing of Cotton. The objective of the Panel is to facilitate the move to standardized instrument classification on an international basis. The Panel plans to achieve this objective by making internationally accepted recommendations for methods, procedures and standards. Recommendations will likely be put together in the form of some type of international agreement in the near future. Two meetings of the Expert Panel were held in 2004; the first in Bremen, Germany in March and the second in Mumbai, India in late November. The USDA has offered to host a third meeting of the Panel during the Triennial Universal Cotton Standards Conference scheduled to take place on June 8, 9 and 10, 2005 in Memphis, Tennessee.

Several action items have resulted from the first two meetings of the Expert Panel. The first action was to decide which measurements should be included in the standardization effort. The decision was made to limit the measurements to micronaire, strength, length, length uniformity index, color Rd and color +b. As a basis for standardizing the test methods, the publications "USDA Guidelines for HVI testing" and the "ITMF HVI User Guide" were recommended. Regarding calibration cottons, it was agreed that the currently established and widely utilized USDA calibration cottons would be recommended.

In order to recognize testing laboratories that meet the criteria established by the Expert Panel, the Panel is considering ways to issue certification to labs desiring to be recognized. Under consideration is the establishment of approximately two international testing centers that would serve as international quality assurance centers. Laboratories, such as the USDA's Quality Assurance Lab in Memphis, Tennessee could be designated as an international center and would retest samples submitted by recognized regional test centers. Regional test centers would in turn provide quality assurance for labs within their respective regions. Certification of regional test centers would be issued by ICAC acting on recommendations from designated organizations including but not necessarily limited to USDA and the Bremen Fiber Institute.

The Expert Panel is also seeking to establish "trading tolerances" for the instrument measurements that are acceptable for commercial trading of cotton. These tolerances would be based on acceptable variations that are typically found between certifiable testing centers and would be used as a basis for commercial trading control limits. The tolerances could also be used for checking or certifying testing performance between international and regional testing centers. In order to determine the magnitude of the trading tolerances, sources of multiple participant test data such as that found in the Bremen Round Test Program and/or the USDA HVI Check Test Program are being considered. Both of these programs provide representation of testing performance from many testing labs around the world. Therefore, the distribution of results found in these tests will be considered as a basis for determining statistical control tolerances that could be used for commercial classification testing.

### **Role of Round Tests in Universal Classification**

Participation in round testing is essential for all labs striving for universal standardization. Both the Bremen Fiber Institute in Bremen, Germany and the USDA offer any participant the ability to test samples and to compare results with other participants. The USDA Check Test Program provides participants with two samples per month. Participants test the samples and send their results back to USDA for analysis. A final summary is sent to all participants each month showing established values for the samples, average results of all participants and

measurement distributions for all participant submitted results. In addition, the USDA offers a Level Assessment Program where participants can send their own samples to the USDA's Quality Assurance Lab in Memphis for testing at no cost. The only cost to participants is the cost for shipping the samples. The only restriction is to limit the number of submitted samples to ten per month per participant during the months of January through August. During the months of September through December, submitted samples are limited to two per month. The QA results for the submitted samples are returned to the participant. Contact [HVICheck.Test@usda.gov](mailto:HVICheck.Test@usda.gov) for more information on either of these programs.

### **ITMF International Committee on Cotton Testing Methods**

The International Textile Manufacturers Federation (ITMF) sponsors the International Committee on Cotton Testing Methods. This committee has been meeting in Bremen, Germany since 1980 and continues to meet every two years to discuss and make recommendations on cotton fiber testing methods and standards. In 1997, the committee published the "HVI User Guide" which provides HVI users with many internationally accepted methods and standards for HVI testing. The USDA has a similar publication called "Guidelines for HVI Testing" that closely parallels the ITMF publication. The efforts of the International Cotton Testing Committee are very important to universal standardization of classification because of the committee's recognized expertise and wide international representation. The ICAC Expert Panel on instrument standardization is soliciting expertise from the ITMF Cotton Testing Methods committee in the standardization effort. The next scheduled meeting of the ITMF committee will be in March of 2006.

### **Universal Cotton Standards Agreement**

The USDA's Universal Cotton Standards Agreement is an agreement between USDA, the U.S. cotton industry and 23 foreign cotton associations from 21 countries. The Agreement serves as a means for providing recommendations to the USDA in regards to the Universal Cotton Standards. The Agreement covered only color and leaf grades until 1995 when approval was given by the Secretary of Agriculture to expand the Agreement to include calibration cottons and moisture conditioning standards for instrument classification. The current agreement includes standards for length, strength, length uniformity index, micronaire, moisture conditioning and a reference to the USDA publication "Guidelines for HVI Testing".

A Universal Cotton Standards Conference is held every three years. Domestic and international participants approve and make recommendations for changes and/or additions to the standards. The next conference is scheduled to take place on June 8, 9 and 10, 2005 in Memphis Tennessee. The USDA has asked conference delegates to consider a recommendation for adopting cotton standards for the color measurements of Rd and +b. In addition, USDA has developed a classer guide book for bark and grass that will be considered for adoption.

### **Information Exchange Initiatives**

The USDA operates the largest instrument based cotton classification system in the world today. The task of classing every bale, for an average yearly U.S. crop of 17 million bales, is achieved by approximately 250 instruments operating in 12 classing offices located across 9 states. The testing labs are integrated together with the Quality Assurance Lab in Memphis, TN to form an overall instrument quality evaluation system that provides bale classification for the measurements of length, strength, micronaire, length uniformity index, color Rd, color +b, and trash content.

Universal standardization of instrument based cotton classification is needed if measurements made in the U.S. are to mean the same thing as measurements made in China or in some other part of the world. International acceptance of one universal standard for cotton classification maximizes the value of classification for the whole global cotton industry. As a result, the USDA, AMS, Cotton Program is actively working with countries interested in developing classification systems similar to the USDA system.

China has undertaken an ambitious reform plan that will transition the current manual classification system to a fully instrument based classification system in five years beginning in August of 2005. In January of 2004, a delegation of Chinese officials visited the USDA in Memphis to begin learning details of the USDA cotton classification system. In the months following this visit, a considerable amount of information exchange took place through email leading

to an invitation from the Chinese to USDA for face to face discussion in China regarding cotton classification. In October of 2004, a delegation of officials from USDA, National Cotton Council and Cotton Incorporated visited with Chinese Fiber Inspection Bureau officials in Beijing, China. The two-way sharing of information that took place established a good working relationship that will continue into the future.

The USDA, AMS, Cotton Program participated in a U.S. government organized cotton assessment initiative to look for areas of potential cooperation between the U.S. and the four major cotton producing West African countries (known as the C-4 countries) of Benin, Mali, Chad and Burkina Faso. A twelve person U.S. technical team was assembled and spent approximately three weeks visiting the cotton industries of these countries. The U.S. team was made up of experts in various areas of cotton including production, ginning, classification, trade, biotech, textiles and research. Of primary interest to this paper, a major part of this assessment was to evaluate the state of cotton classification in the C-4 countries. Cotton classification in each C-4 country is performed by state controlled agencies that have a monopoly on the ginning, classing and marketing of cotton. An effort to privatize these agencies is underway in varying degrees in each country but overall progress has been slow. The classification assessment found varying forms of manual classification with each country utilizing its own manual grading standards. Some limited HVI testing was found but generally only around five percent of crop samples were actually being tested. Recommendations are currently being put together by the assessment team with the goal of assisting the move of classification in West Africa toward more internationally accepted practices. Instrument classification is strongly desired by officials in the West African cotton producing countries but implementation will be challenging. Effective classification, especially instrument classification, is expensive to implement and requires a developed infrastructure, which includes stable utilities, good transportation and established service industries. Unfortunately, these necessary resources are limited in West Africa.

In April of 2004, the USDA participated in a Cotton Incorporated Engineered Fiber Selection (EFS) System Conference in Singapore. The USDA took this opportunity to share information on instrument classification to an audience of international textile manufacturers. An overview of the USDA cotton classification system, the importance of instrument classification to the textile mill and the need for universal standardization were presented. The ease at which instrument data from U.S. cotton can be obtained from the USDA Central Database was also presented and demonstrated. International opportunities in such forums as the EFS Conference are essential for advancing instrument classification on a worldwide basis.

### **Conclusion**

Cotton grown in the U.S. has reaped the benefits of instrument based classification since 1991. Some day, instrument testing will become the normal and accepted practice for measuring cotton quality throughout the world. However, for instrument testing to be successful on a large scale international basis, universal standardization of methods and standards will have to be accepted. The USDA is committed to offering its assistance, backed by years of instrument classing experience to this international effort.