

GIN-BASED CLASSING: FIRST STEPS
Kipp W. Julius, C. Kyle Shofner, and Frederick M. Shofner
Schaffner Technologies, Inc.
Knoxville, TN

Abstract

Gin-based Classing means locating some classing functions at the gin for either process control, logistics, or merchandizing reasons or because certain measurements not used in official classing are needed in some gins. Approximately 7 % of US gins have invested in process monitoring and process control technology, so the first steps towards Gin-based Classing have already been made. These gins maximize the added value for their Producers, yielding them on average 1.5 cents/pound and they provide better fiber and added value for their Merchant and Spinner Customers. Technological advances in computers, networks, Internet, and image-based measurement technology are in place to support Gin-based Classing (GBC). Since Trash is one of the fiber qualities most influenced by the gin, GBC can move forward rapidly when the Human Classer is replaced with the instrument. A progress report is included on STI's image-based Trash measurements and other first steps toward GBC.

Technology Overview

IsoTester® is the new name for the predecessor RapidTester (Figure 3). Both IsoTester and RapidTester are stand-alone classing instrument platforms. IsoTester's robust design and its ability to operate in any environment, particularly gins, in combination with the GinWizard, enable gins to do a better job by controlling the amount of leaf, moisture, and length to "avoid the discounts" for the producers and to provide higher quality and more useable fiber to the mill.

In addition to the IsoTester, a most important part of our developments has been the "GinWizard." (Beltwide 2002: "Status Report on GinWizard") GinWizard is a process monitoring system and software program that can acquire and present fiber quality data products from the IsoTester and as many gin process parameters as desired (Figure 4). One of the main justifications of GinWizard is to collect and disperse information from the content generators, particularly the IsoTester's trash & color modules, moisture modules, length & short fiber content module, etc. GinWizard will become the focal, or more technically, the principal Input/Output node for fiber quality information for process monitoring and process control within the gin.

IsoTester utilizes advanced digital image scanning technology and powerful algorithms for color, trash, bark & grass, and length measurements. Principles of this high fidelity, high resolution, image-based methods are explained in the Bremen 2000 and 2002 papers, "Cotton Classing in the New Millennium" and "New Fiber Classification Methods." (These papers can be downloaded from our website at www.schaffnertech.com.)

IsoTester and the GinWizard System are becoming recognized as a cost-effective, long-term alternatives for cotton classification and gin process control. Gins are investing \$1-\$2/bale in capital and operating expenses to return \$7/bale added value for the producer by "avoiding the discounts" (Figure 5). Also, the ginning industry is responding to the signals in the marketplace by decreasing the number lint cleaners used, decreasing the number of stick machines used, investing in moisture control and restoration systems, and monitoring micronaire in the fields to avoid high micronaire discounts (Dr. Hal Lewis).

Schaffner Technologies developed the IsoTester and GinWizard based on the following principles and long-term vision that Gin-based Classing will be implemented by 2020: 1) improved measurement methods on a robust, internet enabled, modular platform that are more scientifically based and more meaningful to all parties involved in the production, ginning, warehousing, marketing, and spinning of cotton, 2) a system which will not only provide measurements of all quality factors but with the capability of displaying images and data to the gin supervisor and gin manager to make production and quality decisions and to provide better fiber to the mill, and 3) a system that will be compatible with the anticipated changes in the way cotton will be marketed. This includes the ability to transmit true-color digital images and data over the Internet to USDA/AMS, producers, and potential buyers.

Gin-Based Classing

Gin-based Classing may be distinguished from traditional classing as follows:

Traditional Classing: Collect samples and ship them to remote sites for human and/or instrument classing. Archival store many physical samples remotely and the data in database(s); (Figure 6)

Gin-based Classing: Execute instrumental classing locally (in gins, warehouses, or mills) and transfer the fiber quality measurements, including images, over the internet. Archival store few samples for calibration confirmation and all data, including images, in databases. (Figure 7)

By classing we mean the measurement of any fiber quality which impacts production, ginning, marketing, or spinning, whether or not that data is used “officially,” typically government-implemented classing programs.

In this “GBC model,” the need for USDA/AMS to observe and maintain integrity will be needed; however, instead of transporting, conditioning, handling cotton, classing, maintaining instruments, reporting, etc...the USDA will be 3rd party maintaining the same data quality integrity.

One interesting transition from Traditional to GBC begins with the acquisition of images(Figure 7), along with other fiber quality data, at the gin. These data and images are transferred over the Internet for classification and other judgements and decisions, such as buy/sell decisions, by humans. This means that a human classification would be made by classers looking at a high fidelity reproduction of the image file on a color video monitor.

To better appreciate the concept that cotton classification can be performed over the Internet, it is instructive to describe the operation of the classer, as follows. Digital cotton images would be forwarded to USDA and archived in database. Classers would immediately observe images on a high resolution monitor in comparison to digital standards and make their “official” classing call (This is a temporary solution until an instrument measurement of trash is accepted by the USDA). Within minutes, classing information would be sent back to the gin. Randomly, these images would be forwarded to other classers to maintain level in USDA’s check-test program. If the tracking between USDA “official” classing call and IsoTester is consistent, this allows the ginner to “hit the money numbers” for the producers by avoiding the discounts.

To be able to track the USDA, Schaffner Technologies developed Data Merge Program to compare bale to bale the IsoTester classing data with USDA classing data for comparison. This was the first step to making sure that the IsoTester was tracking the USDA. On average, for the 11 US gin customers, we tracked the USDA ~ 70% of the time based on a bale by bale basis. Based on module averaging, we track ~ 95% of the time.

In response to our customer’s request, each week during ginning season, we will email a Weekly Tracking Report (Figure 8). The ability to remotely download data, merge, adjust offsets, and update programs is powerful and part of the remote service we provide.

Conclusions

IsoTester and GinWizard enable the intelligent ginner to adjust various control points to maximize turnout while minimizing fiber damage. These new tools also enable the ginner to take process control actions to minimize the financial penalties based on the CCC loan chart for the producer or any other loan chart. The end-user, Mill, receives more “useable” fiber through a reduction in short fiber content and nep content, at the expense of more trash. Optimizing the ginning process to the benefit of the farmer is an economic tradeoff game. Given the capability to make leaf measurements at the gin empowers the producers, via the ginner, to play the game better.

The challenges to make “official” classing measurements at the gin is paramount to the above objective. One major hurdle to eliminate the classer is to replace the present HVI trashmeter technology. It is not capable of tracking the human classer. STI’s advanced, modern-day technological solution tracks the Classers as well as they track themselves.

The monetary incentives resulting from feedback and feed forward benefits to all concerned justify relocating “officially” classing at the gin or in the warehouse.

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King w. Julius
VP, Sales and Marketing

C. Kyle Shoffner
President

Frederick M. Shoffner
Chairman

Schaffner Technologies, Inc.
Knoxville, Tennessee
www.schaffnertech.com



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Figure 1. Introduction



**PER POUND ADDED VALUE BY
LOCATING COTTON CLASSING
AT THE GIN OR IN THE
WAREHOUSE!**

Figure 2. Value-Added



IsoTester® is a stand-alone instrument capable of measuring color, trash, bark & grass, moisture content, length, short fiber content, and micronaire of each bale produced at the gin.

Figure 3. Isotester



GinWizard® is a separate, stand-alone processing monitoring system whose software acquires and presents data from the **IsoTester** and other content generators to better enable the intelligent ginner to take immediate control actions.....

Figure 4. GinWizard

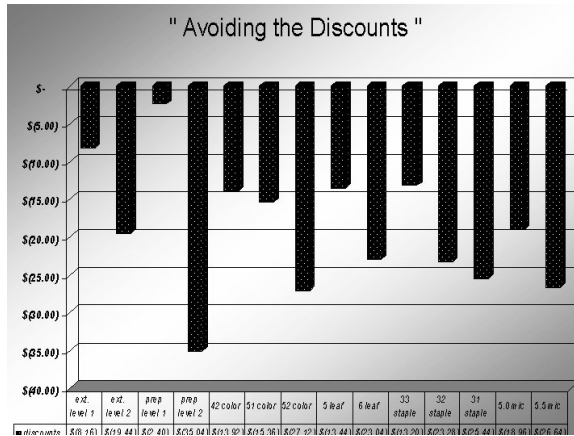
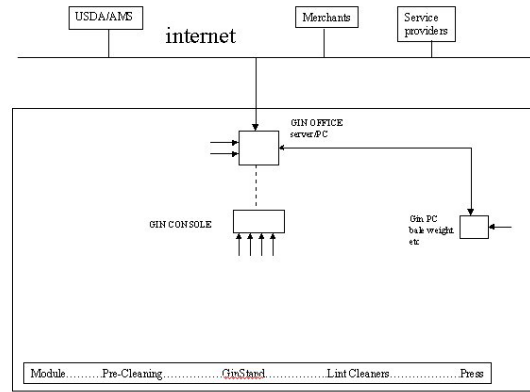
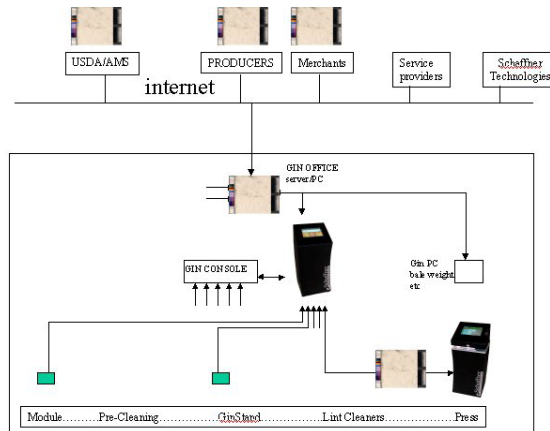


Figure 5. " Avoiding the Discounts"



"Traditional Classing" Diagram

Figure 6. " Traditional Classing"



"Gin-Based Classing" Diagram

Figure 7. "Gin-based Classing"

Schaffner Technologies: Weekly Tracking Report

USDA/AMS “Official” Leaf Classing Data

vs

IsoTester Leaf Classing Data

	bale by bale	module average
mid-south	75.1%	99%
west	66.7%	97%

Figure 8. Weekly Tracking Report