



## THE EFFECTS OF LINT CLEANING ON FIBER AND YARN QUALITY: Part 1

In the March through June 1991 issues of *Textile Topics* we carried a report on the influence lint cleaning at ginning has on fiber quality and spinning efficiency. We mentioned in the first part of that report that a good bit of research was being conducted on this subject and additional reports would be given.

The research results given in those issues of *Topics* were based on cotton received from California which had been ginned with zero, one and two lint cleaners. We announced in March that a study of gin and mill-level cleaning was underway to determine the best cleaning procedure for West Texas stripper-harvested cotton. This newer program was designed to be carried out in two parts. The first was to assess the influence of lint cleaning (after separation of the seed and fiber), while the cleaning of the seed cotton was to remain constant. The second part was to utilize variations in seed cotton cleaning with the introduction of a new Multistage extractor developed at the USDA Ginning Research Laboratory in Lubbock by Roy V. Baker, director of that facility.

While this most recent program is intended to be conducted over a three-year period, the first year's work has been completed and reported to the Texas Food and Fibers Commission (TFFC), one of the sponsors. The results are interesting, and we are giving a synopsis of the report in *Topics* because we believe our readers may find it interesting, also. (The TFFC report required 196 pages in fine print so we will not attempt to give all of it in the limited space of our newsletter. However, selected parts will be carried in this and subsequent issues.)

To begin, the cotton classing system in the United States is frequently criticized, sometimes unjustly, because certain measurements are included in the marketing structure while others of equal or greater importance are not. It appears that the high volume instrument testing system now used by USDA is correcting some of the deficiencies that have existed. To illustrate this, the cotton producer receives the best price for his product when it is clean, having the greatest possible fiber length, and with the micronaire value ranging from 3.8 to 4.2. The ginner who serves

the farmer is obligated to seek the greatest reward he can for his customer, and this means that the bale of fiber presented for marketing should be as white as possible and free from visible portions of trash. Cleanliness outweighs the benefits of providing long fiber, and a cotton that will be sold at a higher price can be prepared by utilizing lint cleaners at the gin after the seed and fiber have been separated. It has been shown that increased lint cleaning causes an increase in short fiber content, but so far this measurement does not enter into the marketing structure. It usually can be assumed that as the short fiber content increases, length uniformity decreases, but again this is not included in the marketing program. Consequently, the ginner assists the producer by cleaning the cotton the best he can to give a higher price, and he does not have to be concerned with uniformity or short fiber content.

It should be remembered that the spinner may suffer the consequences of the cleaning that takes place at the gin to benefit the farmer. In ring spinning it has been found that the increase in short fiber content results in reduced yarn strength and a more variable product. For the rotor spinner, there is a danger that the trash particles within the cotton may be reduced in size so that they remain tangled with the fiber during processing and give increased breakages during yarn formation.

We often hear criticism from the manufacturing industry that our gins are overginning cotton, and requests are being made for "gentle ginning." This comes from the popular notion that there should be less cleaning at the gin and more in the textile mill. The theory here is that the lower production rates in textile manufacturing can give better cleaning with less fiber damage. This conceivably would be the case, but it must be remembered that there are considerable pressures placed on the ginner to process the cotton taken to him in the shortest possible time. (A modern saw gin today can turn out a 500-pound bale of cotton in three minutes, which is a rate of 10,000 pounds per hour.) In a crop year like the most recent one, there has been a tremendous amount of

cotton produced and the demand on the ginner has increased almost to the limit of his ability. The ideal situation would be to gin in a manner to ensure the least possible fiber damage but at the same time accomplish the obligation to the farmer. Considering this, it would be good if the ginner and the textile mill could reach a compromise so that the cotton could be ginned and cleaned without fiber damage before being packaged into a bale.

With an understanding of the needs of the farmer, ginner and spinner, the plan for our research was to obtain a sufficient amount of seed cotton to carry out evaluations under a variety of cleaning procedures at the gin and in textile processing. To satisfy the raw material needs, four modules of irrigated cotton were purchased from a farm near Petersburg, TX. The variety was GSC-25. The four modules, which would normally give 32 to 40 bales when ginned commercially, were taken to the USDA Ginning Research Laboratory at Lubbock. The path of this cotton through the gin is shown in the flow diagram, Figure 1 below. Note that 0, 1 and 2 lint cleaners were used.

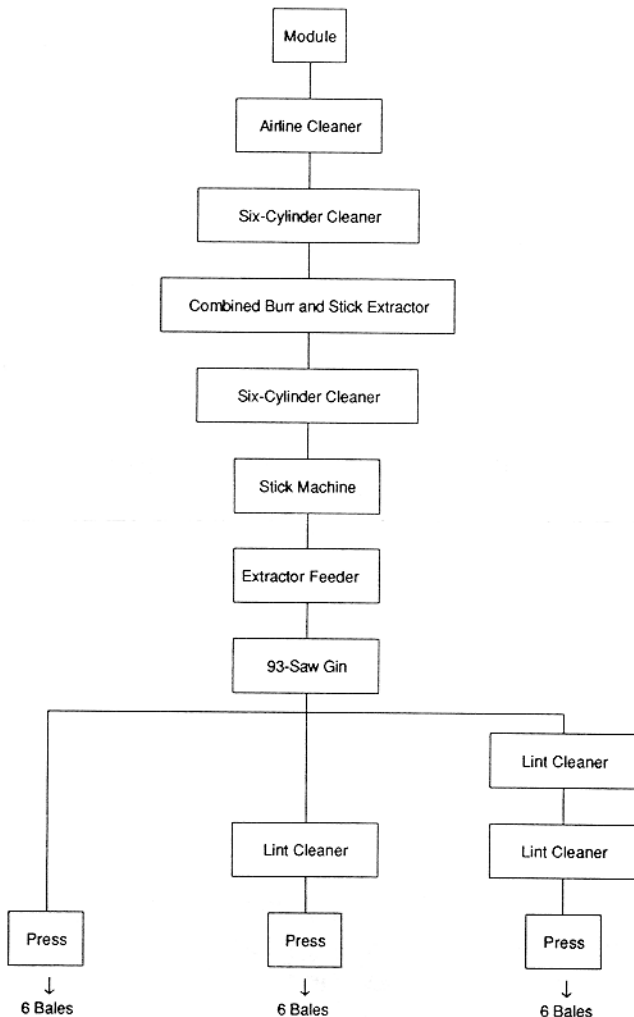


FIGURE 1: MATERIAL FLOW THROUGH GIN

The textile cleaning portion of this project utilized new opening and cleaning equipment that was installed at the International Center in late 1989. Prior to that time we used older machinery not suitable for this type of cleaning study. The new equipment was installed by the Rieter Corporation and included a Monocylinder, dust remover, ERM with nose beater, condenser, and a second ERM with R10/10 clothing on the cleaning roll. At the end of all that, a new Rieter C4 card was put into operation. The installation was made so that different machinery could be used or bypassed, depending upon the requirements of the research being conducted. This gave sufficient flexibility for light opening and cleaning when desired, and maximum cleaning when using the entire system. All the new cleaning equipment follows four standard opening/blending feeders equipped with weighing pans.

Figure 2 below gives a diagram of the processing at the International Center. Please note three different combinations of cleaning were utilized as well as two cards. It will be seen that three levels of lint

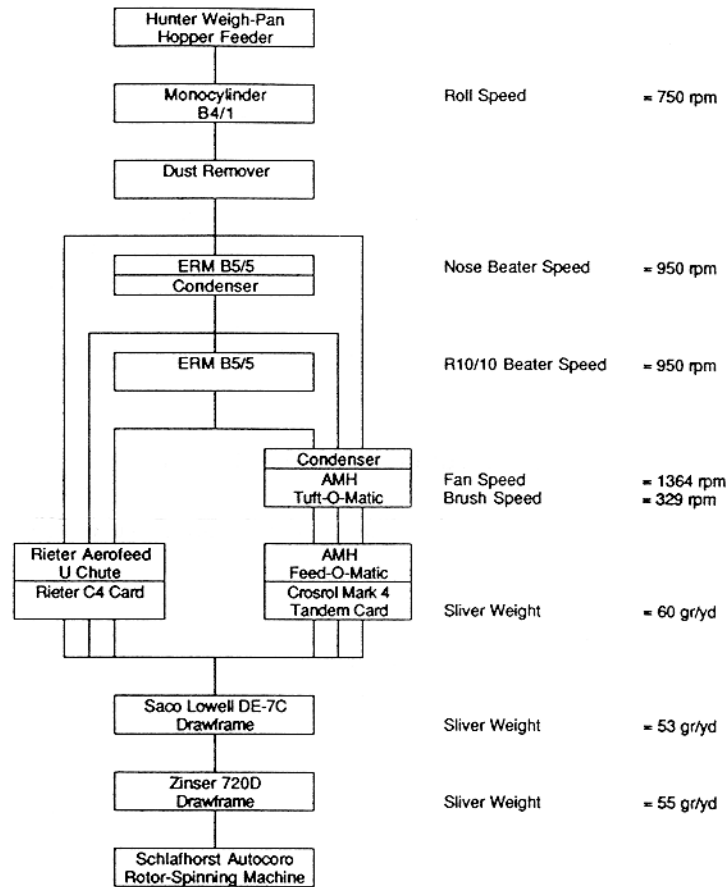


FIGURE 2: OUTLINE OF MILL PROCESSING ROUTES

cleaning were used at the gin and three levels during textile processing. Obviously, this arrangement was designed to fulfill the objective of this study, which was to determine the best cleaning arrangement at the gin and in textile processing to remove the foreign material while preserving fiber quality.

As we have already stated, *Topics* is not a large enough publication to carry the entire report. The information presented here will serve as an introduction to more technical data that will be offered in subsequent issues. We regret we cannot give more each time, but we hope our readers will combine these various segments to make a continuously running document when all have been received.

This study was sponsored jointly by the Texas Food and Fibers Commission and the Agricultural Research Service of the United States Department of Agriculture. The complete report was prepared by John B. Price, assistant director at the International Center.

### **GOVERNOR RICHARDS VISITS CENTER**

Texas Governor Ann Richards visited the International Center on December 20 to attend a meeting of the Texas Textile and Apparel Development Committee. Texas Tech University President Robert Lawless welcomed the governor and members of the Development Committee to the university and the Center. The meeting was organized to consider the possible development of additional textile manufacturing in Texas and to study the effect of such an expansion on the economy of the state. Approximately 65 committee members and invited guests attended.

David Huff of the Texas Department of Commerce organized the meeting and served as moderator. Speakers presenting various aspects of economic development were R. L. "Bob" Day, Marcom/Day Agency, Houston, TX, speaking on opportunities with Mexico; Julia Kveton Apodaca, University of Texas, Austin, who gave a review of the development of natural colored cottons and opportunities for adding value to these by manufacturing yarns and fabrics from the fiber; Kim Dawson, Kim Dawson Agency, Dallas and Carolyn Grant, marketing director for the Austin Collection, speaking on the fashion and apparel industry in Texas; and Carl Cox, Texas Food and Fibers Commission, who discussed the state's wool and mohair industry.

Following these presentations, Governor Richards spoke on the importance of textile fibers and manufacturing to the overall economy of Texas and pointed out the value of the state's three natural fibers. The governor, her staff and members of the Textile and Apparel Committee then toured the Center to review some of the research being conducted here.

Among those attending the meeting and accompanying the governor were her son Dan Richards; State Senator John Montford; State Representative Delwin Jones; Mark Ellison of the Texas Department of Agriculture; Charles G. Scruggs, president of Torado Ventures, Austin; Tom R. Wallace, San Antonio; George Lenox, president of Lenox Textiles, Dallas; Tommy Fondren, Lorenzo, TX; and Don Marble, South Plains, TX.

We were pleased to have Governor Richards visit with us, and we appreciate her sincere interest in the many research projects underway at the center.

### **ORGANIC COTTON**

In May 1988, the Texas Department of Agriculture (TDA) adopted a code standards and certification for organic foods. In 1991, as a result of many inquiries concerning the availability of chemical-free cotton to be used in such articles as sheets, pillowcases and clothing for persons having extreme allergy problems, the TDA expanded this code to include cotton. It seems that certain chemicals applied during cotton production and harvesting, as well as those applied during textile processing, may cause problems for some people. Therefore, the Texas Department of Agriculture believed it proper to certify farmers who are willing to produce cotton without the use of chemicals and harvest aids.

Organic farming is defined in the TDA code as "A system of ecological soil management that relies on building humus levels through crop rotations, recycling organic wastes, and applying balanced mineral amendments and that uses, when necessary, mechanical, botanical, or biological controls with minimum adverse effects on health and the environment." We have heard that some farmers are now producing cotton without the use of any chemicals at all and are receiving certification as organic cotton producers.

To further protect the purity of the fiber, the processing of it into yarns and fabrics must meet established standards. Obviously, cotton received at a textile mill could be totally free of chemicals, but certain procedures used in the production of fabrics would normally include chemicals that would remove the fiber from the purity category. We are not sure how many textile manufacturers will be interested in producing fabric from organic cotton, but we are aware that it can be done.

In fact, the International Center has been certified as a processing facility for organic cotton. This certification was granted in December and must be renewed each year at the same time. The renewal follows an inspection by the Texas Department of Agriculture staff to assure that processing here is being conducted without the addition of chemicals that

would eliminate the organic purity of the fiber.

We find this rather interesting, and we hope the organic cotton being produced in Texas will be beneficial to those individuals who are acutely allergic to certain chemicals.

## **OTHER VISITORS**

In addition to those mentioned previously, visitors to the Center during December included George L. Sullivan, Memphis Cotton Exchange Cotton School, Memphis, TN; Barbara Shaeffer, Peyer/Motion Control, Dallas, TX; Roger Bolick, Allied Fibers, Hopewell, VA; Hans Suter and Rudi Propst, Rieter Corporation, Spartanburg, SC; Jim Crawford, Muleshoe, TX; Jimmy Powell, Ft. Mc/Kavett, TX; Len Mertz, San Angelo, TX; J.C. Mathiews, Texas & Midwestern Consultants Co., Woodson, TX; Don R. Bradshaw, Eastland, TX; Allen Terrell, Hollingsworth Service Co., Forney, TX; Ron Hershberger, Hydro-Text, San Antonio, TX; and Santa Claus, North Pole, Planet Earth.