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INTEGRATION OF HIGH VOLUME INSTRUMENT SYSTEM WITH SHIRLEY FINENESS/MATURITY TESTER

The International Center for Textile Research continues to evaluate instruments for measuring cotton fiber fineness and maturity. One of the most promising is manufactured by Shirley Developments of Stockport, England, known as a Fineness/Maturity Tester and referred to as the FMT3.

We have recently integrated two identical FMT3 units with late model HVI systems. We are utilizing these in an attempt to determine the accuracy of the fineness and maturity measurements and the compatibility of these instruments with standard HVI systems. Our research is supervised by Harvin R. Smith, head of our Materials Evaluation laboratories. Requests for information on this are received frequently, and Mr. Smith is asked to give reports on our studies at various conferences. Earlier this year he made a presentation at the 1990 Beltwide Cotton Conference. We thought his remarks there were quite interesting, and decided to carry them in *Textile Topics*. Therefore, the following is taken from the speech Mr. Smith gave at the conference.

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At the 1989 Beltwide Conference in Nashville, I reported on our research with a stand-alone model of the Shirley Developments Fineness and Maturity Tester, known as the FMT3. That report indicated the instrument had potential for inclusion with HVI systems and pointed out that the results were meaningful and significant when used as estimates of yarn dye uptake and nep content in dyed fabrics.

We now have two new HVI systems installed at the International Center; one is a Motion Control Model 4000 and the other a Spinlab Model 900B. Both systems are equipped with Shirley FMT3 units. These instruments are integrated to the HVI systems both physically and electronically. The HVI cabinets are about one meter longer than the standard housings because we did not remove the micronaire from the HVI systems. This was done so the HVI units could operate independently or integrated with the FMT instruments.

Programmers from Spinlab and Motion Control modified some very complex software to accommodate the FMT instruments on short notice. There are still a few problems in these programs, but both are now working in an acceptable manner. The FMT3 is programmed by using programmable read-only memory chips, and changes cannot be made in-house. The latest modifications to the FMT software were completed in the middle of our fiber testing season, and we have not had as much time as we would like to devote to instrument evaluation. Therefore, we do not have our results as complete as they might be otherwise.

Based on early precision trials, we have observed a lower level of repeatability with the current instruments than we reported last year using the stand-alone instrument. This problem was traced to the operator not being aware of the moment the instrument had accepted the specimen weight. She could continue to add or take away fibers after acceptance, thus the mass presented to the instrument would differ from the mass accepted in the memory, resulting in gross errors. It appears this problem has now been corrected, but the system is still not completely operator proof.

The precision levels for the average of two readings conducted recently were about the same as, or better than, those reported last year. The standard deviations for this small test were:

Micronaire	0.065
Maturity Ratio	0.026
Pct. Mature Fibers	2.05
Fineness	4.60

All these numbers are lower than those reported in 1989, but the difference may not be statistically significant. We need much more data to support these figures.

Testing speed, using preblended samples and making two tests per sample on the FMT and four tests per sample on the Motion Control 4000, was

timed at the rate of about 70 samples per hour. This is about 45 to 50 seconds per sample. The Motion Control HVI operates faster than this, so there was about a 5 to 10 second delay while the HVI was waiting for the data from the FMT. In spite of this, we believe it is technically feasible to match the two instruments in this configuration. Another aspect of this question is the possibility of using only one test on the FMT as we now do when determing micronaire. Should this prove feasible, then the FMT may already be fast enough to do the job.

At this point, the weak link in the integrated HVI/FMT system has been the fiber blender. The maturity/fineness test requires a clean, well-blended specimen for accurate results. We received two new blenders in March 1990, and these seem to be performing in a good manner. Our research with these instruments is continuing, and we expect to have more conclusive results within the next two months.

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STRENGTH MEASUREMENTS FOR COTTON FIBER AND YARN

In our work with various cotton organizations throughout the world, we continue to observe that many are still using the Pressley measurement for determining fiber strength. Apparently, most companies in the United States no longer use Pressley values, and the U.S. Department of Agriculture has dropped it completely from its reports on cotton quality. However, we report this measurement when summarizing results that go to other countries and any time it is requested. Because our annual report on Texas cotton quality is distributed to friends in many locations, we give Pressley results along with those coming from the Stelometer and High Volume Instrument systems.

We recently were reviewing the information compiled in the 1988 report on Texas cotton quality, and we became aware of an opportunity to make a special analysis of fiber and yarn properties. All of the cottons were produced in Texas and most were of an upland variety. Because of several recent discussions about the value of Pressley strength, we decided to undertake a comparison of Pressley and Stelometer values and determine how these correlate with yarn strength.

We thought it would be appropriate to first determine the correlation between the two methods of measuring cotton fiber strength. We have observed for many years, and have reported in several issues of *Textile Topics*, that the Pressley and Stelometer tests are conducted in different ways. We also have noted there is not a good correlation between the results obtained, and there is no accurate means of converting the results of one to the other.

The information included in the 1988 Texas Cotton Quality Evaluation gave average values of each of eighteen cottons, with the averages coming from six individual tests. Therefore, the values used in our statistical analyses were based on averages of subgroups of six. A complete analysis of fiber strength values was made. Because the total information obtained was quite extensive, we will give here only the coefficients of correlations. Our analysis of the information revealed that the correlation coefficient between the Pressley values and those coming from the Stelometer was 0.38, obviously not very good, and about the same as we have noted in the past.

Our normal procedure for measuring yarn strength includes tests on both single strands and 120-yard skeins. The single-strand tenacity is obtained using the Zellweger-Uster Tensorapid tester, while skein tests are made on a Scott Pendulum instrument. Realizing that different procedures are used in different locations, just as different fiber test methods are used, we thought it appropriate to include yarn strengths from both skein and single-strand tests in our analysis.

Our evaluation of the 1988 Texas cotton crop included the spinning of three yarns on each of three different machines, two rotor and one ring. As a greater portion of the fiber strength is realized in ring yarns than in O-E yarns (*Textile Topics*, Volume XV, No. 12, August 1987), we decided to restrict our investigation to ring yarn and selected a 22/1 for this. And, as our report does not actually list pounds of skein breaking strength but gives count x strength products (CSP), we used these values in determining the fiber/yarn correlations. Therefore, the correlation coefficients given here were obtained from Pressley and Stelometer fiber strength measurements, and by using yarn count x strength products and tenacities expressed in grams/tex.

Remembering that the coefficient of correlation between Pressley and Stelometer results for the data used was only 0.38, it might be expected that the correlation between each fiber testing method and yarn strength would be different. This was found to be true, with the correlation between the Stelometer fiber strength and yarn strength being better than that derived when using the Pressley instrument.

The coefficients of correlation in the table (next page) show the relationship between the two methods of fiber testing and the different yarn strength measurements. It will be noted that these correlation values are lower than we would normally expect, and we believe this is due to having only 18 lots in the study. However, a ranking of the data

agrees with previous studies of this nature. It is obvious that the Stelometer/single-strand combination gives the best correlation, followed by HVI/single-strand. The poorest relationship exists between the Pressley "0" gauge and skein strength.

All fiber and yarn tests were conducted in our Material Evaluations Laboratory under the supervision of Harvin Smith, head of that department. He is assisted by Pauline Williams and ten technicians.

The research that generated the information included in the 1988 Texas Cotton Quality Evaluation was sponsored by the Texas Food and Fiber Commission.

We would like to point out that the 1988 report is still available and can be sent upon request. The 1989 Texas Cotton Quality Evaluation report is now available, also.

Fiber Test Method	Yarn Test Method	Coefficient of Correlation
Pressley "0" Gauge	120-yard Skein (CSP)	0.20
Pressley "0" Gauge	Single-Strand Tenacity	0.31
Stelometer 1/8" Gauge	120-yard Skein (CSP)	0.48
Stelometer 1/8" Gauge	Single-Strand Tenacity	0.54
HVI 1/8" Gauge	120-yard Skein (CSP)	0.44
HVI 1/8" Gauge	Single-Strand Tenacity	0.49

NEW ROTOR SPINNING MACHINE INSTALLED

We are pleased to announce that a new Schlafhorst Autocoro rotor spinning machine has recently been installed at the International Center for Textile Research. This is a Model SRKP machine that contains automatic end piecing with cleaning and overhead blower, automatic package doffer, starter winding and reserve station, and a full-package conveyer. It is equipped with conical package delivery and noise-abatement features. This machine will be used to complement the research that has been conducted on another Autocoro that was installed here in January 1985.

Our research on cotton continues to expand and requires more studies involving rotor spinning. We have recognized the necessity of installing additional state-of-the-art equipment that has the ability to spin quality yarns at high production and efficiency levels. Current research, which will utilize the new Schlafhorst machine, is designed to better define the minimum number of fibers in the cross-section of fine yarns that are to be spun at 100,000 rpm.

Other open-end spinning machines in use at the International Center are the Schlafhorst Autocoro mentioned above, a Rieter RU-14 Spincomat, a Rieter m 1/1, a Schubert & Salzer RU-11, an Investa BD 200M, an Elitex BD 200S, a Rieter m 0/5, and a Suessen Spintester. All of these are used as required to fulfill the needs in evaluating cotton and other fibers at rotor spinning. Our research is directed by John B. Price, assistant director of the Center, and is supervised by William D. Cole, manager of our New Spinning Technology laboratory, with assistance from Albert Esquibel and Joe Luis DeLeon.

THANK YOU, THANK YOU, THANK YOU

You are great! The response to last month's request for help in updating our mailing list has been fantastic. We thank everyone for your assistance with this small but important task.

VISITORS

Visitors to the International Center during May included Mark W. Bishopric, Spray Cotton Mills, Eden, NC; James L. Powell, Fort KcKavett, TX; Len Mertz and James E. Cogan, San Angelo, TX; James F. Menke, Kenneth C. Risner and David Hodnik, United Filters Inc., Amarillo, TX; Adolf Schweizer, Rieter Corporation, Spartanburg, SC; George B. Blomquist, Jr., Parkdale Mills Inc., Gastonia, NC; Barbara Shaeffer, Motion Control Inc., Dallas, TX; Boong Loo Jeon, Korea Textile Testing & Inspecting Institute, Seoul, Korea; Albert J. W. Bote, Baumwoll-Kommissions-und Lagerhauser GMBH, Bremen, Germany; and Michael Schwager, Textil Grupp Hof, Hof/Saale, Germany.

Groups included ten participants from the Association of College & University Printers, who weremeeting at Texas Tech University, and 339 students from area elementary and secondary schools.