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FIBER/YARN STRENGTH RELATIONSHIP (Part 2)

As stated in the August *Textile Topics*, we will use this issue to conclude our report on strength relationships between cotton fiber and the yarns spun from it. The information we gave last month dealt with an N_e 22 ring-spun yarn, using data taken from the Texas Cotton Quality Evaluation, Crop of 1989. The information presented here utilizes the same cottons but shows the correlations existing between the fiber and N_e 22 rotor-spun yarn.

Our previous report included fiber test results from the Spinlab Stelometer and the Pressley instrument. Table I below gives the values taken from our crop evaluation study. We would like to point out that each count-strength-product value is an average of ten 120-yard skein tests. Single yarn tenacities are averages of 100 tests, and both Pressley and Stelometer fiber strength values are averages of six tests.

TABLE I

Fiber and Yarn Strength Values

Lot No.	Fiber		Yarn (22/1 Rotor-spun)	
	Pressley	Stelometer (g/tex)	CSP	Tenacity (g/tex)
1	83.8	25.1	1871	12.0
2	89.4	23.6	1633	10.4
3	85.4	21.8	1840	11.8
4	88.3	25.0	2034	12.7
5	95.6	27.7	2359	14.9
6	93.6	26.5	2080	13.0
7	86.0	23.6	1832	11.8
8	84.0	23.2	1827	11.6
9	86.6	25.8	1953	12.4
10	86.5	22.5	1735	11.2
11	83.9	23.4	1888	11.8
12	83.0	24.2	1883	11.6
13	85.5	24.7	1934	12.3
14	83.2	23.6	1964	12.2
15	81.9	25.0	1951	12.2
16	84.7	23.6	2073	13.3
17	83.4	24.5	1885	12.2
18	94.9	24.8	2141	13.7

Pressley Value x 1,000

The first point of interest in Table I is that both the count-strength-product measurements and single yarn tenacities for the rotor yarn are lower than those for the ring-spun yarn. This is normally expected.

Table II gives the coefficients of correlation between the two fiber strength measuring systems, and between these systems and the yarn strength measurements. The correlation coefficient between Pressley "0" gauge and Stelometer 1/8-inch gauge is the same as reported last month. However, the other values are based on the 22/1 rotor yarn rather than the ring-spun yarn, and all are different except the coefficient between Pressley "0" gauge and yarn CSP, which again is 0.57. The next three coefficients of correlation are less than than those reported for the ring yarn, although the final value, showing the correlation between count-strength-product and single-yarn tenacity, is slightly higher.

We hope this information will be of interest to our readers. You may wish to refer to the August issue of *Topics* to get background details.

Our study of fiber and yarn strengths is sponsored by the Texas Food and Fibers Commission. We are grateful for the support of that agency in the dissemination of our research results.

TABLE II

Coefficients of Correlation
(Rotor-spun Yarns)

Strength Measurements	"r" Value
Pressley "0"-Gauge Fiber Strength vs. Stelometer 1/8" Grams/tex	0.55
Pressley "0"-Gauge Fiber Strength vs. Yarn Count-Strength-Product	0.57
Pressley "0"-Gauge Fiber Strength vs. Single-Yarn Tenacity (g/tex)	0.59
Spinlab Stelometer 1/8"-Gauge G/tex vs. Yarn Count-Strength-Product	0.73
Spinlab Stelometer 1/8"-Gauge G/tex vs. Single-Yarn Tenacity (g/tex)	0.70
Yarn Count-Strength-Product vs. Single-Yarn Tenacity (g/tex)	0.99

COTTON FINENESS/MATURITY RESEARCH

In previous issues of *Topics* we have reported results of our research on the use of the Shirley Developments FMT-3 tester for determining cotton fineness and maturity. This study is continuing as we seek the best means of measuring these fiber properties.

We recently completed our Annual Report to the Texas Food & Fibers Commission (TFFC), and in it we included a summary of our work on testing cotton fineness and maturity. Our research has been sponsored by that agency. The report to the Commission was prepared by Harvin R. Smith, head of our materials evaluation laboratory, and John B. Price, assistant director of the International Center.

The following is a condensation of the full report. We believe this may be of interest to many of our readers.

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"Work on this project began in August 1988 with the delivery of a stand-alone model of a high-speed Fineness and Maturity Tester from Shirley Developments, Ltd. of Stockport, England. A preliminary paper on the evaluation of this machine was published in *Textile Topics* in the Nov. 1988 issue. This paper was also presented at the Beltwide Cotton Conference in January 1989. The abstract of the paper reads as follows:

> *" 'Preliminary evaluation of the Shirley Developments, Ltd. Model FMT-3 instrument for measuring micronaire index, maturity and linear density of cotton fibers indicates that the instrument has the potential speed to be considered as a candidate for inclusion in high volume instrument systems. Although the higher speed was obtained with a slight sacrifice in precision when compared with the slower laboratory models (FMT-1a, FMT-2), test results are meaningful and significant when used as estimates of yarn dye uptake and nep content of dyed fabrics.'*

"In the fall of 1989 two new Model FMT-3 instruments were [placed] in the International Center's Materials Evaluation laboratory. One of these instruments was fitted to a Motion Control Model 4000 HVI [line] and the other was conected to a Spinlab Model 900 HVI. These . . . arrived without high-speed blenders and also arrived during the peak of our busy testing season, so very little evaluation data were generated until after March 1990 when two new high-speed blenders arrived. A progress report on this work was presented to the Beltwide Conference in January 1990, and this paper was also published in *Textile Topics* in the May 1990 issue. The paper reported that the testing speed had improved from 60 seconds for the previous model to 40-50 seconds for a two-specimen test. It also indicated that this added speed was obtained without further sacrifice in precision. The 40- to 50-second testing speed is still about 10 seconds too slow to keep up with the HVI system but there is . . . hope this speed can be improved further.

"Between March and July 1990 work continued on improving the performance of the FMT-3 instrument and the fiber blenders. A bothersome problem during this period was keeping the two machines calibrated to the same level using the pressure regulators. Taking an idea from the HVI systems, we suggested to the manufacturer that they install a software calibration program so that the pressure valves could be set at constant levels and the computer program would automatically adjust for any deviation of the PL and Ph values for a standard cotton. This program was installed in mid-July 1990, and the first series of tests made using this program is the subject of this report.

"Four different cottons were selected for this study. Two . . . were International Cotton Calibration Standards I-26 and C-35 on which PL and Ph values had been established. The other two were 'working' samples which were being used in the laboratory to try to keep the two FMT-3 instruments on the same level. All four cottons were well-blended . . . card web obtained from the Cotton Division of USDA. The assistance of USDA in providing this material . . . is gratefully acknowledged.

"During a replication, each of the four test samples were measured ten times using an average of two specimens per measurement on each of the two FMT-3 instruments. Five replications were run on five different days spanning a two-week period. This all adds up to 50 two-specimen tests for each sample on each instrument.

"For the software calibration procedure, Shirley Developments Ltd. has selected International Cotton Calibration Standard Bale H-3. This is a very high micronaire (nominal 6.0) upland cotton and well above the range of most upland-type cottons of the world.

"In the automatic calibration mode, the procedure requires five tests on cotton H-3 and then automatically adjusts the PL and Ph for any variations from the standard values. These corrections are then applied to all of the cottons measured until another calibration takes place. This procedure was used on each FMT-3 for the five replications.

"A comparison of the test results of the two International Standards with the values previously established for these cottons is shown on the [facing] page.

COTTON I-26	Standard	MCI-FMT	Spinlab-FMT
Mike	4.9	4.96	5.02
Mat. Ratio	.943	.938	.964
Fineness	207	208.6	209.2

COTTON C-35	Standard	MCI-FMT	Spinlab-FMT
Mike	3.46	3.56	3.60
Mat. Ratio	.893	.870	.908
Fineness	139	148.6	145.8

"These data show that the results for cotton I-26 were very close to the established values while that for C-35 were further from the standard. It appears that the correction made on the H-3 calibration cotton does not adequately adjust for samples as they get further away from the H-3 test values. In other words, the test values for I-26 (4.9 mike) are closer to the standard than C-35 (3.5 mike). This indicates that if a single cotton is to be used for automatic calibration it should be one nearer the model group of upland cottons. Somewhere in the 4.0 - 4.5 micronaire range would be better. The alternative, and probably more accurate, way to do it is to use two calibration cottons and correct for level as well as the difference between the two.

"[In conclusion,] automatic calibration provides a way to obtain consistent results from FMT-3 instruments on a day-to-day basis. This study also indicates that there are still some improvements to be made in the areas of standard bale selection and bale substitution in the current program. Also, use of two cottons should be considered as a way to provide for both test slope corrections as well as level adjustments."

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LEADERSHP LUBBOCK PARTICIPANTS VISIT CENTER

We had a special group called *Leadership Lubbock* visit the International Center during September. This group is made up of individuals who are considered leaders in their various businesses. They come from the medical profession, utilities, banking, law firms, investment companies, cotton organizations, and other businesses. The objective of *Leadership Lubbock* is to develop individuals who can serve as leaders for the various enterprises in the Lubbock area. This is accomplished by having the members of the group visit and study various organizations that contribute to the economic base and community development of the region.

Group members visiting the Center were Dr. Barry Bartee, DDS; Mrs. Mikell Bollinger, Texas Tech University Health Science Center; Mrs. Dana Box, Lubbock Power & Water; Kevin Brimeyer, Southwestern Public Service Co.; Rodney Cates, Texas Instruments; Will Dodson, Lubbock County Judge; Larry Elliott, KAMC-TV; Steve Errico, Southwest Coca-Cola Bottling Co.; Max Garza, City of Lubbock; Scott Gibson, Gibson Plumbing Co.; Mrs. Neriman Guven, American State Bank; Mrs. DiAnn Hutchinson, Hutchinson Cycles, Inc.; Robert Jones, Crenshaw, Dupree & Milam; Mrs. Phyllis Kinnison, Lubbock Independent School District; Randy Laycock, Lubbock National Bank; and Clay Leaverton, First National Bank.

Also, Mrs. Jackie Lindsey, Shearson Lehman Hutton; Mike Martin, Southwestern Bell Telephone; Jimmy McKenzie, City Bank; Mike Oles, Brown-McKee, Inc.; Mrs. Deborah Penner, Deborah J. Penner, Attorney at Law; Eddie Read, St. Mary of the Plains Hospital; Mrs. Tina Ridley, Phil Price Advertising, Inc.; Randy Roberts, Ramar Communications, Inc.; Dr. Gary Schwede, Animal Hospital of Lubbock; Steve Sexton, Sexton Enterprises, Inc.; Steve Stone, Baker Clifford, Krier & Webb, P.C.; Rick Trice, Caraway, McMahon & Co.; Glenn Warren, W. D. Wilkins Furniture; and Mrs. Cindy Whitehead, Plains Cotton Cooperative Association.

We were pleased to have this group.

OTHER VISITORS

September visitors in addition to the Lubbock Leadership group included Roger Bolick, Allied Fibers, Hopewell, VA; Carl Cox, Texas Food & Fibers Commission, Dallas, TX; Yechiel Tal, Mivhor Farm, Kiriat-Gat, Israel; Moustafa Megahead, Cotton Research Institute, Giza, Egypt; Aslam Yousuf, Sandoz Pakistan Ltd., Lahore, Pakistan; Thomas Schneider and Helmuth E. J. Harig, Faserinstitut Bremen e.V., Bremen, Germany; and 50 Agricultural Economics students from Texas Tech University's College of Agriculture.