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SPINNING FINE OPEN-END YARNS -- PART III In recent months, the Textile Research Center has been studying the practicability of spinning fine yarns on open-end machinery. We have reported some of the results obtained from this work in two earlier issues of *Textile Topics*. We refer our readers to the September 1985 issue (Vol. XIV, No. 1) and the December 1985 issue (Vol. XIV, No. 4). In both reports we gave the cotton fiber properties and the results of spinning N_e 40 from carded and combed stock. In last month's *Topics* we also carried information about the spinning of N_e 50, both carded and combed. We mentioned that we were spinning N_e 60 and the report on that would be included in this month's bulletin.

In our preliminary trials on this study (September issue of *Topics*), we used an Acala cotton from the southwestern area of Texas. This cotton had a 2.5% span length of 1.15 inches and a strength of 29.9 grams/tex. In the research reported in the December issue, we changed to a Pima cotton that was longer and stronger. We did this thinking that anyone planning to spin yarns as fine as N_e 50 and 60 would likely go to Pima or some other variety with equivalent properties. We are including in Table I the fiber properties that were given last month, hoping this will be helpful to our readers. We wish to point out that the N_e 60 yarn reported in this issue of *Topics* was made from exactly the same cotton that was used in the research reported last month.

We mentioned before and would like to state again that our study does not attempt to evaluate the economics of spinning fine yarns on rotor machines, but rather is done purely to investigate the mechanical possibilities. We feel this may be of value to many of our friends in the textile industry, for the trend in rotor spinning has been to finer yarns. We believe it is entirely possible that yarns such as N_e 40, 50 and perhaps even 60 will be commercially produced on O-E machines within the next few years.

Table II gives the mechanical details of the machine used and the testing results of the yarn produced on it. It will be seen that our goal was to produce an N_e 60 yarn at 72,000 rpm rotor speed and a 7,000 rpm opening roller speed. Also, this yarn was spun at three different twist levels using twist multipliers of 4.50, 5.00 and 5.49. While the nominal yarn number was N_e 60, the actual numbers were something less than that. In the carded yarns, these ranged as low as 56, while the combed yarns were all slightly finer than 58. The twist levels seemed to give minimal differences in the strength of the carded yarns, but the lowest twist gave the strongest yarn for the combed stock. The bar charts on page 3 present results that generally would be expected. The count-strength-products of the combed yarns were greater than the carded yarns except at the highest twist level, where the strength of the two yarns was the same. Also, the non-uniformity of the combed yarns was greater than that in the carded yarns.

The spinning performance is shown at the bottom of Table II and we call your attention to the last entry, which is Break Rate per Thousand Rotor Hours. Because the test duration for the carded yarns was less than for the combed yarns, the actual number of breaks was lower. However, the break rate shows there was no great difference in the spinning performance, although the carded yarns seemed to spin better.

We realize that N_e 60 may be very near the rotor spinning limit of the cotton used in this study, and that may be responsible for the narrowing of differences between the carded and combed yarns. Whatever the case may be, we are beginning to question the contribution of combing for yarns at this

TABLE I

Fiber Properties

Strength (g/tex)	31.1
Elongation (%)	5.92
2.5% Span Length (in)	1.278
Uniformity Ratio (%)	42.8
Short Fiber Content (%)	8.0
Micronaire	4.08
Non-Lint Content (%)	2.0

TABLE II

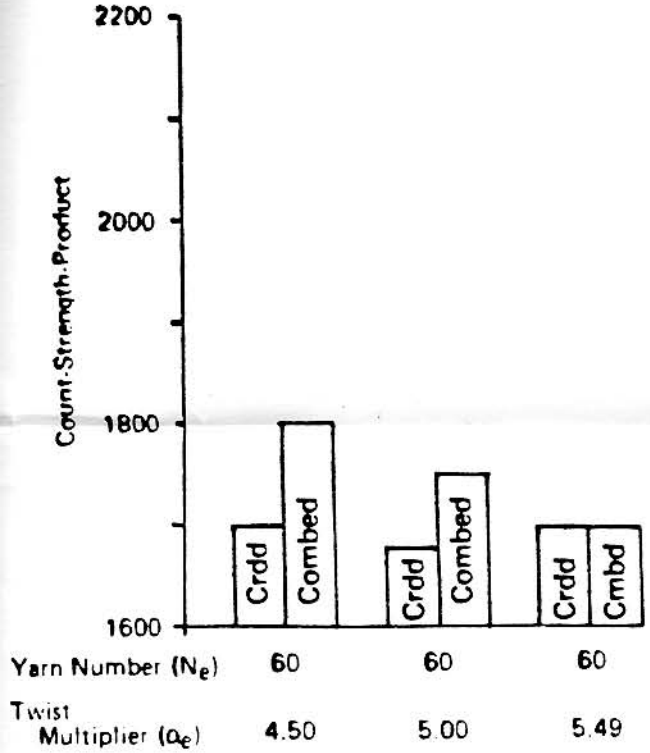
Machine Specifications and Yarn Testing Results

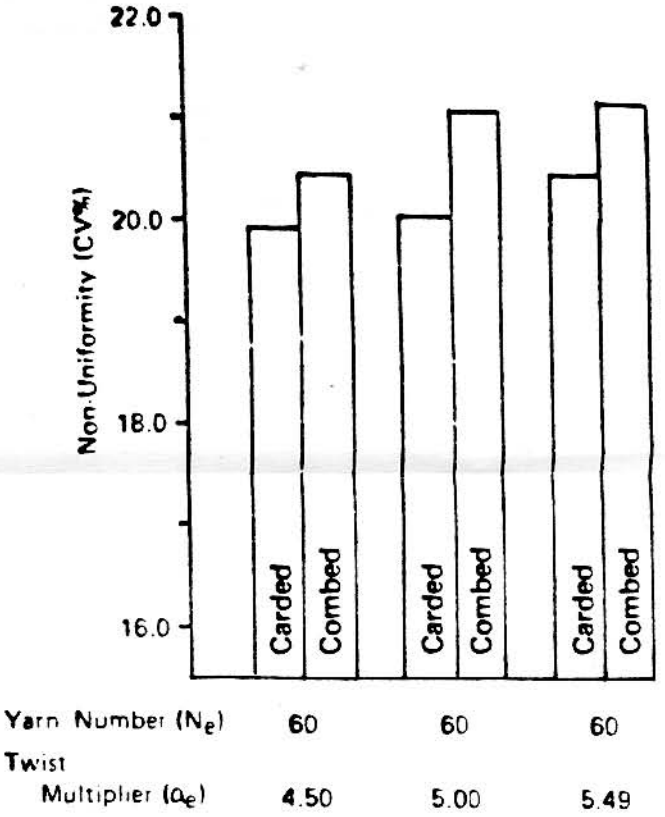
Sliver	40 gr/yd 2nd Passage Drawframe After Carding			40 gr/yd 2nd Passage Drawframe After Combing*		
Machine	Schlafhorst Autocoro					
Nominal Yarn Number (N_e)	60/1					
Rotor Type	G40					
Rotor Speed (rpm)	72,000					
Opening Roller Type	OB20					
Opening Roller Speed (rpm)	7000					
Draft	273					
Twist Multiplier (α_e)	4.50	5.00	5.49	4.50	5.00	5.49
Yarn Speed (yd/min)	57.4	51.7	43.0	57.4	51.7	43.0
Navel	KK4					
Ambient Conditions	72°F/56% RH					
Test Duration (Rotor hours)	5.7	6.4	7.0	40.0	14.8	16.3
YARN PROPERTIES						
Skein Test:						
Yarn Number (N_e)	56.72	55.95	56.68	58.84	58.54	58.25
CV% of Yarn Number	1.3	2.1	2.5	2.0	2.4	1.8
Count-Strength-Product	1699	1678	1699	1800	1750	1699
CV% of CSP	3.3	2.4	4.4	4.6	2.5	2.4
Single Yarn Tensile Test:						
Tenacity (g/tex)	13.40	13.43	13.70	14.85	13.90	13.88
Mean Strength (g)	140	142	143	149	140	141
CV% of Strength	11.7	14.4	13.9	11.7	13.3	12.9
Elongation (%)	4.69	4.62	4.64	5.17	5.05	5.20
CV% of Elongation	13.1	15.8	16.9	12.0	13.4	12.7
Specific Work of Rupture (g/tex)	0.331	0.331	0.340	0.377	0.357	0.364
CV% of Work of Rupture	21.7	25.6	26.0	21.1	23.5	23.3
Initial Modulus (g/tex)	436	447	453	424	430	423
Uster Evenness Test:						
Non-Uniformity (CV%)	19.93	20.04	20.45	20.47	21.09	21.14
Thin Places/1,000 yds	573	601	623	706	842	793
Thick Places/1,000 yds	674	680	844	746	944	990
Neps/1,000 yds	2036	1900	2377	1669	2084	2132
Hairs/100 yds	125	105	92	194	127	109
Performance:						
Number of Breaks	6	5	7	55	16	24
Break Rate/1,000 Rotor hours	1050	788	1003	1375	1081	1474

*Noils Removed in Combing = 15.3%

level. While the removal of short fibers does contribute to a stronger yarn, the resulting non-uniformity, hairiness, nep count, and spinning performance raise some doubts about the value of the extra processing and the removal of 15.3% of the stock at combing. Yarn quality and spinning efficiency likely will vary from machine to machine and from one textile operation to another, but we do want to mention that as we have moved to finer numbers, there seems to be less to gain by combing.

This study is sponsored by the Natural Fibers and Food Protein Commission of Texas and is being directed by John B. Price, head of TRC's new spinning technologies research.





REPORT AVAILABLE ON 1985 TEXAS COTTON QUALITY Each year since 1980, the Textile Research Center has conducted an evaluation of the Texas cotton quality for the Natural Fibers and Food Protein Commission of Texas. The study of the 1985 crop has just been completed, and a report is available for interested persons. A number of these will be mailed soon to those who have already indicated interest, and others will be sent to our readers upon request. Anyone wishing to have a copy can write to the Textile Research Center at the address shown on the back page of *Textile Topics*.

This most recent evaluation was made on sixteen bales of cotton from various areas of Texas. These came from the Rio Grande Valley, the El Paso area, Central Texas, the Rolling Plains region, and the High Plains of West Texas (Lubbock area). In previous years we have not mentioned the variety of the cotton evaluated in this study, but because of inquiries about this, we are giving that information this year. No special parameters were used in obtaining the cottons for this study. Each bale was chosen on the basis of being representative of the area in which it was grown and being commercially available in adequate quantities for purchase by industry. We made no attempt to select a given quality and simply purchased the various bales through commercial channels.

This report presents detailed fiber properties of each bale. Fiber testing was done by individual instruments such as the Stelometer and Fibrograph, by the Motion Control 3000 HVI System, and the Spinlab 800 Series. Additionally, each of the bales was evaluated by spinning three yarns (N_e 10, 22, 30) on a Rieter m1/1 open-end machine, the same numbers on a Schlafhorst Autorcoro, and three (N_e 16, 22, 30) on a standard Saco Lowell ring spinning machine.

This report is offered to cotton producers, marketing firms and textile manufacturers who have an interest in Texas cotton. We are grateful to the Natural Fibers & Food Protein Commission of Texas for sponsoring this evaluation and permitting us to publish the information.

VISITORS We had a number of visitors with us during January, and we would like to mention some of them. On January 8, six members of the Texas Farm Bureau from Lamesa, Texas came to the Center to meet with officers of the Lubbock-based Plains Cotton Growers. On the following day, Dr. Lauro Cavazos, President of Texas Tech University, met with 30 members of the Leadership Lubbock Class. We were pleased to have these visitors tour the Center and see the research underway here.

Other visitors included Michael G. Buchanan and James W. Chandler, Jr., Robert J. Warden Company, Arvada, CO; Roger Bolick, Allied Plastics & Fibers, Hopewell, VA; Robert Joseph, Ocot, Inc., Odem, TX; Jim McSwain and Harold Hogue, Zellweger Uster Corporation, Charlotte, NC; Danny Hammett, Peyer Corporation, Spartanburg, SC; Scott Gessner, Dow Chemical Co., Freeport, TX; Barbara Shaeffer, Motion Control Inc., Dallas, TX; Heinz Herring, Siegfried Peyer AG, Wollerau, Switzerland; M. C. Kwok, Peyer Corporation, Hong Kong; Mr. & Mrs. Ivo Kovac, Opatija, Yugoslavia; Gideon Shahaf, The Cotton Production and Marketing Board, Ltd., Tel Aviv, Israel; Uzi Eilat, Shan Ltd., Beit-Shan, Israel; and Gad Fischer, Shan Regional Enterprises, Eden Experimental Station, Beit-Shan, Israel.