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A STUDY OF MICRODUST IN COTTON

In the early days of open-end spinning research at the International Center (1973-74), it was quickly observed that the Elitex BD 200M machine collected dust in its rotors. This happened because the machine was not designed for trash extraction. As all later models were equipped with dust extraction systems, we decided to retain the BD 200M and use it as a means of determining the amount of dust in cotton sliver that is spun into open-end yarns. Jack Towery, who was in charge of our O-E spinning research at that time, designed a test for this which is still used today. (We conduct this test frequently for textile companies that apparently are evaluating new opening lines or different types of carding.)

We do not have space here to give a complete description of the test, but we will be pleased to send a copy of the procedure to anyone interested. As there are not many BD 200M machines left, we are not sure that the test can be performed at just any location. However, we will continue to serve industry by conducting the test for those requesting it.

Related to this, we would like to report on a study completed last year for the Natural Fibers and Food Protein Commission of Texas (NFFPC). This was initiated because of published reports and inquiries about whether cottons from certain production areas contain abrasive dust that will cause excessive wear on knitting machine components While one area or another has been suggested as producing cottons with excessive dust, we are not aware that anyone has yet thoroughly demonstrated that inorganic matter is solely reponsible for increased knitting needle wear. It should be mentioned that some of those raising this question were at the time in the process of changing from ring-spun to rotor yarns for their knitting production. It is well known that the two yarns are physically different because of the methods of spinning. Ring yarns are considered by some to be cleaner since they are not formed on a bed of dust and are subjected to a severe bending force at the traveler, which could serve to remove foreign particles.

Whatever the case may be, it has been observed that something definitely causes additional wear of knitting machine components. While we do not have means for analyzing every possibility, we thought it would be of interest to compare cottons from two different sources that are used by many spinners for producing yarns that go to the knitting industry.

With the assistance of the Plains Cotton Cooperative Association of Lubbock, Texas, we obtained four cottons, two having been produced in the Mississippi Delta area and the other two in the High Plains of West Texas. All four cottons came from the 1987-88 production season.

Processing of these was conducted in exactly the same manner. Each lot was opened, cleaned, and then carded at 60 pounds/hour. Each was drawn two times and then formed into sliver that weighed 55 grains/yard. The slivers were then used for spinning two yarn numbers on the BD 200M machine. Fiber properties of the four cottons are shown in Table I on the next page.

The first test involved the production of N_e 10 yarn with a 5.0 twist multiplier. The dust determination test calls for four hours of spinning on 20 rotors for a total of 80 rotor hours. After spinning is completed, the rotors are carefully cleaned, and the deposits from the rotor groove and ledge are precisely separated and saved for weighing. The weight of the deposits is expressed in milligrams per kilogram of yarn.

The second yarn, produced on the same machine, was an N_e 26 with a twist multiplier of 3.8. Here again, the dust was carefully collected and weighed.

Spinning performance for all four cottons was acceptable when producing the N_e 10 yarn. In retrospect, however, the choice of the second yarn (N_e 26) and the twist multiplier used for it seems to have been ambitious. The rotor speed for both yarns was 36,000 rpm. Table II (next page) gives the amount of dust collected for each of the four cottons and also shows the break rate of the yarn during spinning. It will be noted that there were no ends down while the N_e 10 was being produced,

TABLE I

FIBER PROPERTIES

Instrument	Property	Delta Cotton A	Delta Cotton B	Texas Cotton A	Texas Cotton B
Stelometer	Tenacity (g/tex)	24.2	23.9	24.1	25.2
	Elongation (%)	6.6	5.8	6.1	6.1
Digital Fibrograph	2.5% Span Length (in)	1.12	1.05	1.07	1.09
	Uniformity Ratio (%)	45.5	47.7	45.0	48.5
	Short Fiber Content (%)	2.8	1.7	1.8	1.4
Fibronaire	Micronaire	4.0	4.5	3.5	3.4
Shirley Analyzer	Non-Lint Content (%)	2.2	1.1	2.6	3.0
Pressley	Specific Strength (Mpsi)	90.4	92.6	86.3	91.8
Shirley F/MT	Percent Mature Fibers	74	78	71	68
	Fineness (millitex)	191	201	171	158

TABLE II

DUST STUDY DATA

Spinning Machine	Yarn Count	Deposit Location and Break Rate	Delta Cotton A	Delta Cotton B	Texas Cotton A	Texas Cotton B
BD 200M	10	Ledge	34.9	25.7	33.7	27.0
		Groove	1.2	1.2	1.9	1.7
		Total Deposit*	36.1	26.9	35.6	28.7
		Break Rate**	0	0	0	0
BD 200M	26	Ledge	64.4	26.6	56.7	42.7
		Groove	48.2	26.0	111.2	118.2
		Total Deposit*	112.6	52.6	167.9	160.9
		Break Rate**	338	1381	725	669

*per kilogram of yarn spun

**per 1,000 rotor hours

but the break rate for the N_e 26 was quite high, indicating that the yarn number should have been lower and/or the twist multiplier higher. The low twist multiplier may have contributed to the higher dust level retained by the rotor. In any event, a comparison can be made between the cottons produced in the two different areas.

It is interesting to note that both Texas cottons had a higher percentage of non-lint as determined by the Shirley Analyzer, but the dust collected while spinning the N_e 10 yarns was nearly the same as that coming from the Delta cottons. However, the higher non-lint content in the Texas cottons resulted in more dust collected while spinning the N_e 26.

As has already been indicated, spinning of the N_e 26 was erratic and questionable. While one of the Delta cottons resulted in the fewest broken ends during spinning at this level, the other lot from the same area had a break rate virtually double that of the two Texas cottons. We feel that a yarn around N_e 18 would have been more practical, and we intend to use a lower number when we have an opportunity to repeat this study.

As mentioned earlier, this research was sponsored by the NFFPC. We are grateful to that organization for its support and its willingness to permit publication of these results.

This program was supervised by John B. Price, Assistant Director, and was conducted by William E. Cole, manager of our open-end spinning department.

INSTALLATION OF RIETER EQUIPMENT

In the November 1988 issue of *Textile Topics* we mentioned that new opening, cleaning and carding equipment had been ordered from the Rieter Corporation. We are pleased to report that the machinery is now being installed and we expect it to be operating in the near future.

We mentioned in the earlier article that the state-of-the-art blowroom machinery includes a metal extractor, a Monocylinder cleaner model B 4/1, and two ERM cleaners model B 5/3. These machines are being installed in such a manner that they can be used in various arrangements to provide different levels of cleaning. (Perhaps we should mention that part of the equipment we have utilized in the past will be retained. Altogether, the new and already-installed machinery should give us a high degree of versatility.) Additionally, an Aerofeed-U chute system and a new high production model C4 card have been installed.

Although final connections to these machines have not yet been made, this will be done shortly. Plans are to utilize our new equipment in an extensive program to determine the best cleaning procedures for various qualities of cotton. These cottons will come from both spindle picking and high-production stripping, and will have been ginned with various cleaning arrangements.

We feel the new machinery will broaden our research base and permit us to conduct studies we have not been able to do previously. We greatly appreciate the assistance of the Rieter Corporation in making this equipment available and installing it so promptly.

VISITORS

Visitors to the International Center during January included Charles Curry, Roberts & Curry, Greenville, SC; Dean Pelczar, Cotton Incorporated, Raleigh, NC; Randy Nichols, B. P. America, Warrenton, OH; Kenneth Westmoreland, Ted A. Podbereski and Associates, Canyon Lakes, TX; Andrew Giles, E. I. DuPont de Nemours & Co., Old Hickory, TN; Roger Bolick, Allied Fibers, Hopewell, VA; Susan Kerr Landrum, Allied Fibers, Petersburg, VA; Judy Peters, Allied Fibers, New York, NY; Tom Reiser, Allied Fibers, Columbia, SC; David Gillespie and Gary Harrell, Abington, Inc., Spartanburg, SC; Charles Riggs, Jack Gill and Les Wilk, Texas Women's University, Denton, TX; Seburn Crocker and Bucky Powell, Henkel Chemical Co., Charlotte, NC; Gregory Starke, Texas A&M University, College Station, TX; Paul Johnson, Northrup King Co., New Deal, TX; Sergio Davila and Mario Gomez, Northrup King Co., Guadalajara, Mexico; and Mr & Mrs. Royce Beights, Custom Ag Service, Inc., Loraine, TX.

Visiting groups included thirty administrators and instructors from the Texas Tech Health Sciences Center School of Nursing; thirty-seven Agricultural Economics students from Texas Tech University's College of Agricultural Sciences; and ten students from Monterey High School, Lubbock, TX.