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STUDIES OF DUST IN COTTON SLIVER

Since the advent of rotor spinning, textile companies have been concerned with dust particles in the finisher sliver fed to the spinning machine. In the early days, before these machines were equipped with dust removal systems, there was concern about accumulation in the rotors which caused poor spinning efficiency and lowered yarn quality. It was soon realized that some method should be developed to remove the dust particles, and all of today's rotor machines are constructed to accomplish this.

The first open-end machine installed at the International Center was an Elitex BD200M made in Czechoslovakia. This was followed by several others that were equipped with dust removal systems. We retained the BD200M to assist with our overall research effort, and today it is used as an instrument to measure the amount of dust in finisher sliver supplied to rotor machines. It is interesting to note that at one time this particular machine was considered to have a deficiency because it did not remove dust, but today it is very useful in our research as a means of evaluating the amount of dust in sliver.

The evaluation we conduct with this machine was initiated in 1975. Since that time we have perfomed it for many companies interested in knowing the efficiency of their opening room equipment and cards. The test has developed into a routine procedure, one that has revealed some interesting results. Obviously, the more efficient the cleaning, the less dust will remain in the sliver that goes to spinning.

We are presenting in this issue of *Topics* a review of the work we have done during the past ten years, which we feel will be of interest to our readers. However, we believe we should first outline the test procedure itself, and this is given below and at right.

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FINISHER SLIVER DUST TEST PROCEDURE

1. **An Elitex BD200M rotor spinning machine is used to produce Ne10 yarn with a twist multiplier of 5.0 at a rotor speed of 36,000 rpm. Opening rollers of type OK40 are operated at 8000 rpm. Spinboxes are equipped with smooth navels having a radius of curvature of 4.0 mm.**
2. **Two pounds of sliver are supplied to each of twenty rotors.**
3. **Sufficient yarn is spun for testing and adjustments in draft are made to assure the required Ne 10 yarn.**
4. **Before proceeding, all rotors are thoroughly cleaned.**
5. **Spinning is initiated on all twenty (20) rotors.**
6. **Spinning is continued for a total of four hours of machine time, piecing any ends down without cleaning the rotors.**
7. **When the four-hour test period has been completed, machine is stopped.**
8. **Yarn packages are removed and weighed to determine the total quantity of yarn spun. Weight of yarn is expressed in kilograms.**
9. **Each spinbox is opened and fibers present in the rotor are carefully removed.**
10. **A cut-away plastic cup is inserted into the space between the rotor wall and rotor housing. Deposit from the groove is carefully brushed into the cup. This procedure is repeated for all rotors and the total accumulation is placed in a sealable container (zip-lock plastic bag).**
11. **Using the cut-away cup as before, residue is collected from the ledge (the area of the rotor at which the pumping holes are located) of each of the 20 rotors. Deposits are combined and placed in a second sealable container.**
12. **Each container is weighed with and without the contents. Weight of deposits is recorded in milligrams.**
13. **Groove and ledge deposits are expressed in milligrams per kilogram of yarn.**

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In 1985 an analysis was made of the results of performing dust studies on 52 slivers prepared and submitted by various manufacturers. The study was performed to permit the test results to be expressed in relative terms to provide some indication of the cleanliness of the material, in comparison with others.

The analysis has been repeated, and in this study

a total of 346 results formed the data set collected over a period of ten years from industrially-prepared sliver. The histograms of the deposits show that the ledge deposits give a Normal distribution whereas the rotor deposits are not so distributed. The logarithms of the rotor deposit data, however, were Normally distributed. Knowledge of the mean and standard deviation permits calculation of various percentage points of the distribution. These values may be used as an assessment of the cleanliness of the sliver. For instance, a groove deposit of less than 0.7 mg/kg was achieved in only five percent of the tests performed.

As would be expected, those companies using the service provided by the International Center have demonstrated that cleaner cottons are being prepared. Since the 1985 analysis was made with 52 slivers, the median of the ledge deposit data has fallen from 37.4 to 36.3 mg/kg, whereas the median of the rotor deposit data has decreased from 68.9 to 16.9 mg/kg of yarn.

A large proportion of the ledge deposit is made up of fiber fragments. Presumably, a significant proportion may be generated by the action of the opening roll. A regression analysis has shown no evidence that ledge deposits vary with rotor deposits.

Rotor deposits contain heavier trash particles and indicate the quantities which arise in production conditions. They appear to reflect changes in cleaning equipment more than ledge deposits. This can be seen in changes in the experience values between analyses. Accompanying the reduction in the median between analyses was a decline from 10.5 to 1.37 mg/kg for the upper limit of the first decile of the distribution. These changes indicate the success that some companies have had in reducing the trash content of sliver supplied to the spinning machine.

DUST STUDY EXPERIENCE VALUES
(346 Industrial Samples 1981–1991)

Percentage	Ledge Deposit (mg/kg yarn)	Groove Deposit (mg/kg yarn)
< 1.0	≤ 11.4	≤ 0.20
1.0 – 5.0	11.5 – 18.9	0.21 – 0.70
5.0 – 10.0	19.0 – 22.9	0.71 – 1.37
10.0 – 25.0	23.0 – 29.6	1.38 – 4.14
25.0 – 75.0	29.7 – 44.6	4.15 – 48.50
75.0 – 90.0	44.7 – 51.3	48.6 – 146.90
90.0 – 95.0	51.4 – 55.3	147.0 – 285.00
95.0 – 99.0	55.4 – 62.9	286.0 – 988.00
> 99.0	≥ 63.0	≥ 989.0
Median	36.3	16.9

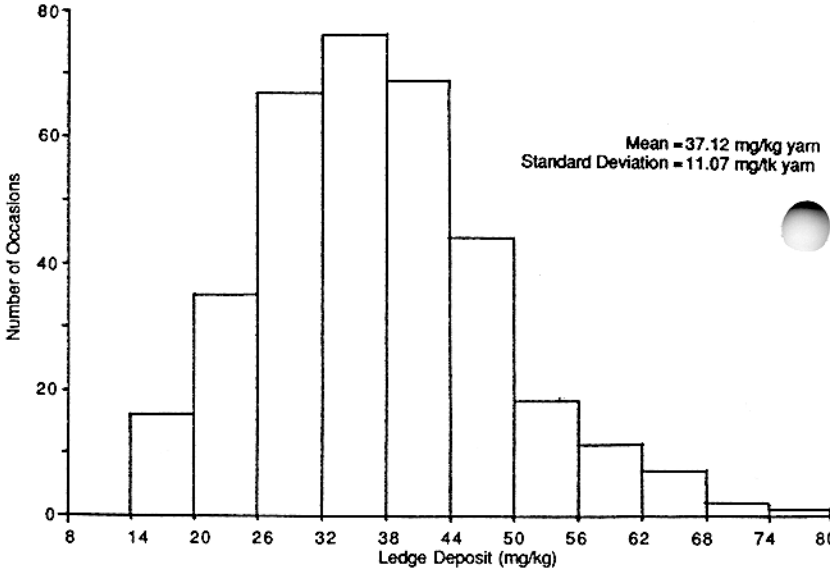

FIGURE 1: HISTOGRAM OF LEDGE DEPOSITS

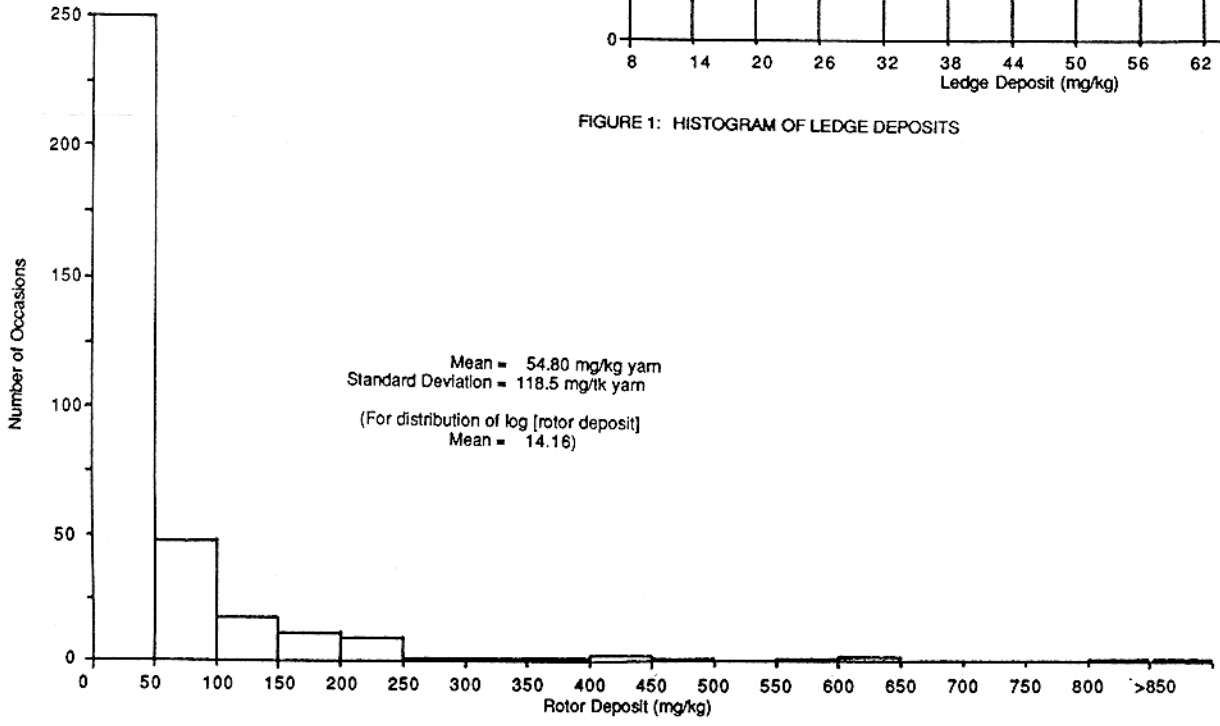

FIGURE 2: HISTOGRAM OF ROTOR DEPOSITS

EXCHANGE OF TECHNOLOGY

One of the objectives of publishing *Textile Topics* is to disseminate technical data generated by the research conducted at the International Center. A number of organizations around the world have written to request permission to reproduce certain of our reports in bulletins printed in various countries, many requiring translation for their readers. Our response has been, "Yes, this may be reproduced, but please give credit to *Textile Topics* and the International Center for Textile Research and Development."

In June, Harvin Smith, head of our materials evaluation laboratory, spent three weeks in Taiwan, Republic of China, consulting with companies that use cotton produced in Texas. He found that a periodical published by the Taiwan Cotton Spinners Association had reproduced a report carried in our May 1990 issue. We found this interesting, and we are reproducing a page from that article at right, thinking it also may be of interest to our readers.

We are pleased our friends in Taiwan believed one of our reports worthy of reproduction. We appreciate the credit given to Texas Tech University and the Texas Food and Fibers Commission.

棉花／羊毛混紡于棉紡工程（高附加價值紡紗法）
（Short Wool on the Cotton System）

譯自TRC "TEXTILE TOPICS"
Texas Tech University／Texas May 1990

在以往幾期的"紡織文摘"（Textile Topics）曾報導羊毛應用於棉紡工程，我們初步的興趣在於德州短羊毛（Short Texas Wool，即成長6個月的羊所剪下之德州羊毛）混用 20% 至 30% 于德州棉花中混紡，將促成珍奇織物的進展，我們稱之為TEXCELLANA，以前報導此類文章在1984年10月、1985年7月、1986年5月、1987年9月及1989年8月于紡織文摘（Textile Topics）出版過。

最近德州食品及纖維委員會（Texas Food and Fiber Commission）（前身The Natural Fibers & Food Protein Commission of Texas）追加計劃正研究"棉／毛混紡"專案，本研究目的在探討使用80%棉花及20%羊毛于棉系紡紗工程之實際技術細節，並且比較德州短毛及更貴精梳毛條（cut）的應用價值。本計劃用羊毛與棉花混紡在環錠及OE羅陀紡紗，幷研究二種纖維之親密性自清花工程或併條工程開始混紡之優劣比較。本篇資訊，摘自John B.Price（ICTRD助理博士，Texas Food and Fiber Commission）之研究報告。

☆☆☆　　☆☆☆　　☆☆☆

混用德州短毛及64支級精梳切斷毛條，其德州毛上半部長度1.4吋，精梳毛條切斷1.5吋，另使用棉花之品質特性如附表三

我們所用的短羊毛與棉花二種纖維能親密地混紡，並且可用100%棉紡通常生產過程之相同方法順利紡出。最先以環錠工程紡紗，採取通常標準之牽伸及速度。在二道併條機及粗紡機紡出如同一般純棉紡紡紗條件，在此工程中，無論如何我們得到一個心得必須增加初牽伸（Break draft）。但其混紡紗強力減低且紗幹較不均勻，此不均勻條幹有特別

MATTERS OF MAGNITUDE

Last month's *Topics* included a small trivia section entitled "Did you know . . . (or even care?)." One of our statements of erudition told of the number of different compounds contained in the alcoholic beverage known as Scotch. This information, borrowed from the April 1, 1991 issue of *Chemical & Engineering News* published by the American Chemical Society in Washington, DC, apparently contained a misspelled word (at least according to tradition in some countries). In any event, we promptly received a letter from a friend with Ralli Brothers & Coney in Liverpool, England, pointing out our limited knowledge of such important matters.

So that our readers can appreciate the full significance of this, we quote the letter in its entirety in the column at right.

Thank you, Mr. Wilde, for your comments.

7th August 1991

Dear Sir/Madam,

With regards to your item on "Did you know (or even care)" please note Scotch is spelt Whisky and not Whiskey. The latter term is used for similar, inferior brews/distillations from countries other than Scotland i.e. USA, Canada, Ireland etc. Whisky is a name unique to Scotch.

Yours sincerely,

G. WILDE
TECHNICAL MANAGER
& SERIOUS SCOTCH DRINKER
RALLI BROS & CONEY

VISITORS

Visitors to the International Center during July included Jerry M. Lawson, W. W. Wool, Inc., Pleasanton, TX; Kearny Robert, USDA-SRRC, New Orleans, LA; Roger Bolick, Allied Fibers, Hopewell, VA; John Castro, Odessa, TX; Lawrence Hahn, Midland, TX; Don R. Bradshaw, Eastland, TX; J. C. Mathiews, Texas & Midwestern Consultants Company, Woodson, TX; Mr. & Mrs. Jim Crawford, Muleshoe, TX; Linda Shockley and Jennifer Ann Mueller, Little Bear Organic Foods, Pacific Palisades, CA; Sharon Bell, The American College in London, Los Angeles, CA; Wesley Masters, Amarillo, TX; J. Angus Balharry, Halatex, Muirhead by Dundee, Scotland; and Michel Willems, BoWeevil BV, Amsterdam, Holland.

Also, three different groups of 4-H members from Lamesa, TX; Vega, TX; and Arnett, OK, toured the Center at different times during the month.

On July 16, ICI Americas Chemicals brought a group of ten cotton growers from New South Wales, Australia for a tour of the Center. ICI Americas representative Eugene King accompanied the group .

Then, on July 25 more friends from New South Wales visited with us and toured the Center. This group included S. S. O'Brien and P. J. O'Brien, Warren; D. J. O'Brien, Glenanaar, Culargambone; Peter Wilson, Paul Minogue and Hans Woldring, Hassall Associates P/L, Trangie; Alan M. Frost, AFM Developments P/L, Narromine; and M. Egan, Kiameron, Warren. They were accompanied by Texas Agricultural Extension Service area cotton specialist James Supak.

MORE TRIVIA AND OBSCURE FACTS

☞ The rainiest spot in the United States is Mount Waialeale, Hawaii, which receives an average of 460 inches of rainfall per year.

☞ More than 75 percent of the world's 850 active volcanoes lie within the "Ring of Fire", a zone running along the west coast of the Americas from Chile to Alaska and down the east coast of Asia from Siberia to New Zealand.