TRC

TEXTILE TOPICS

TEXTILE RESEARCH CENTER • TEXAS TECH UNIVERSITY • LUBBOCK, TEXAS • USA

Volume XV, No. 1
September 1986

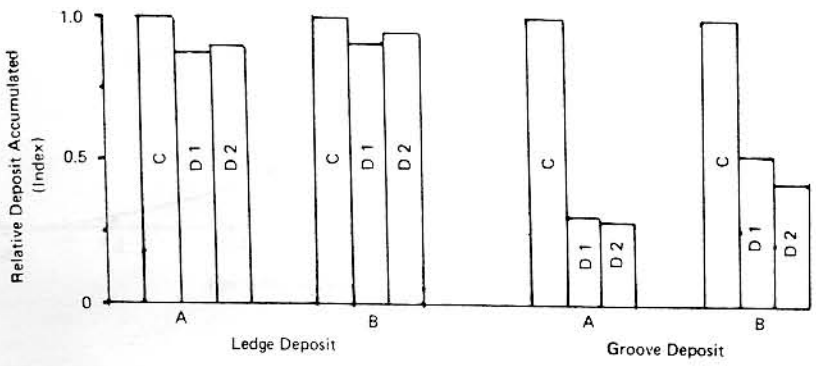
OPEN-END SPINNING: THE INFLUENCE OF SPINNING CONDITIONS ON ROTOR DUST ACCUMULATION – PART II In last month's issue of *Textile Topics* (Vol. XIV, No. 12), we began a report on a study of dust accumulation in the rotors of open-end spinning machines. We mentioned that a test procedure to give a precise measurement of dust particle accumulation was developed some years ago at the Textile Research Center. The procedure employs the Czechoslovakian Elitex BD 200M machine, which does not have a trash extraction system such as today's modern rotor machines have. At the BD 200M, any foreign material present in the sliver entering the machine will be forwarded to the rotor to be removed in the yarn, exhausted through the pumping holes of the rotor, or remain in the groove as a deposit.

TRC's test procedure involves spinning a coarse yarn at a high twist level for a fixed period of time, normally four hours. The coarse yarn and high twist were chosen to reduce the likelihood of yarn breaks which might disturb the accumulated deposit. After the spinning period, the machine is stopped, the spinning chambers opened, and the dust deposit carefully removed. The deposit is collected from both the rotor *ledge*, where the pumping holes are located, and the rotor *groove*. The collected deposits are weighed in milligrams, while the yarn spun during the four-hour period is measured in kilograms. Therefore, the quantities of deposit are expressed in terms of milligrams per kilogram of yarn.

The first part of the report presented the influence of ginning treatment and textile cleaning machinery on dust deposits. In this month's issue of *Topics*, we are giving information on the influence of processing prior to spinning and the effects of certain spinning conditions.

As the card is the most intensive cleaning machine in textile processing, it is not surprising to find that modifications at this machine lead to changes in the amount of dust in the sliver produced by it. An increase in carding production generally causes an increase in rotor groove deposits, but does not necessarily produce an increase in the dust accumulation on the rotor ledge. When crush rolls are used at carding, the ledge deposit tends to increase whereas the groove deposit tends to decrease. Altering the undercasing of the card gives little change in ledge deposit, but can noticeably influence the groove deposit. Increasing the flat speed was found to reduce the groove deposit, and tandem carding produces a marked reduction in both ledge and groove deposits.

FIGURE 1: INFLUENCE OF PREPARATORY PROCESSES



As for drawing, the first passage through the machine has been found to reduce both the ledge and groove deposits, particularly the latter. A second drawing passage gave a further although lesser reduction in groove deposits. This is shown graphically in Figure 1, where the bars identified by D 1 illustrate the influence of the first drawing process and those marked D 2 represent the second drawing. These are compared to the card's influence on dust accumulation by an index arrangement.

FIGURE 2: INFLUENCE OF TIME ON ROTOR DEPOSIT ACCUMULATION RATE

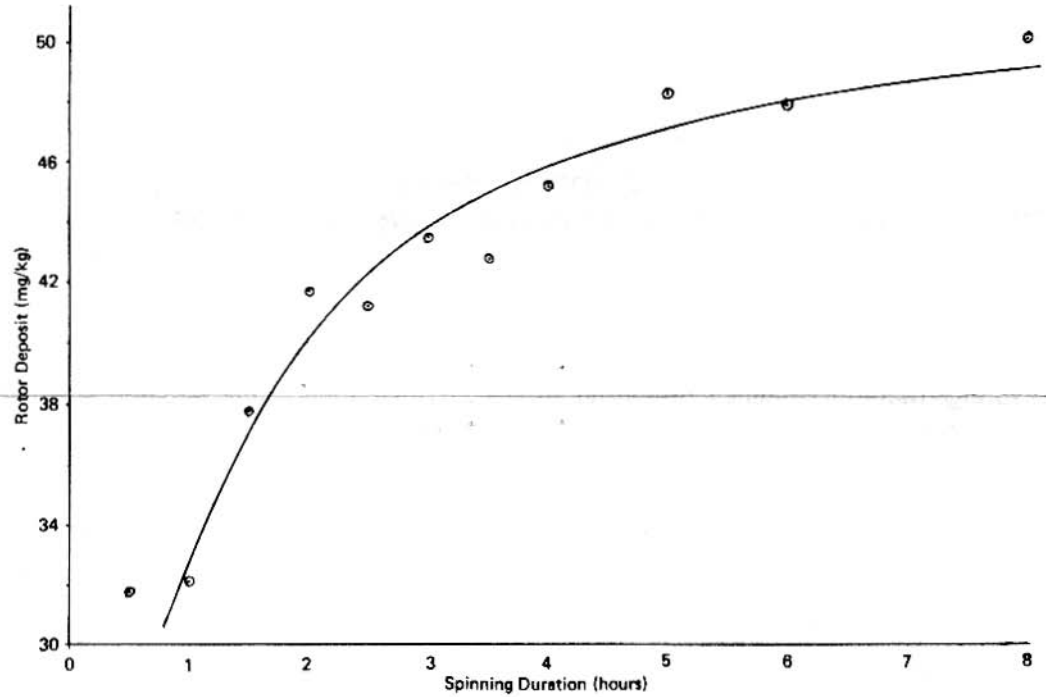


FIGURE 3: INFLUENCE OF YARN NUMBER ON ROTOR DEPOSIT

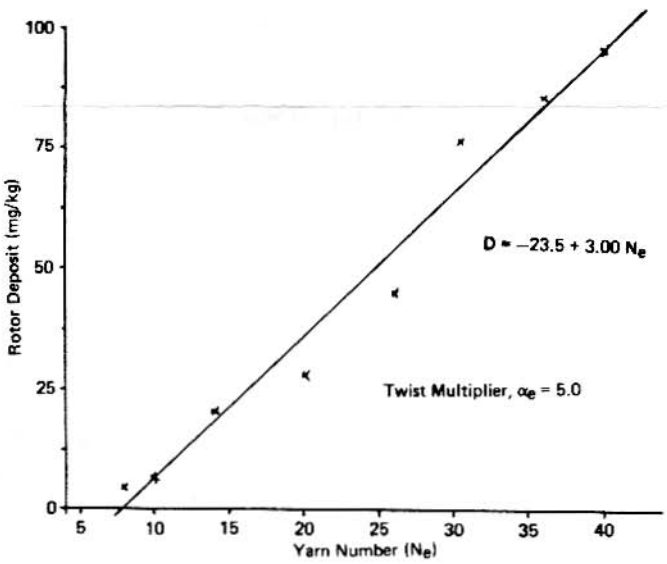
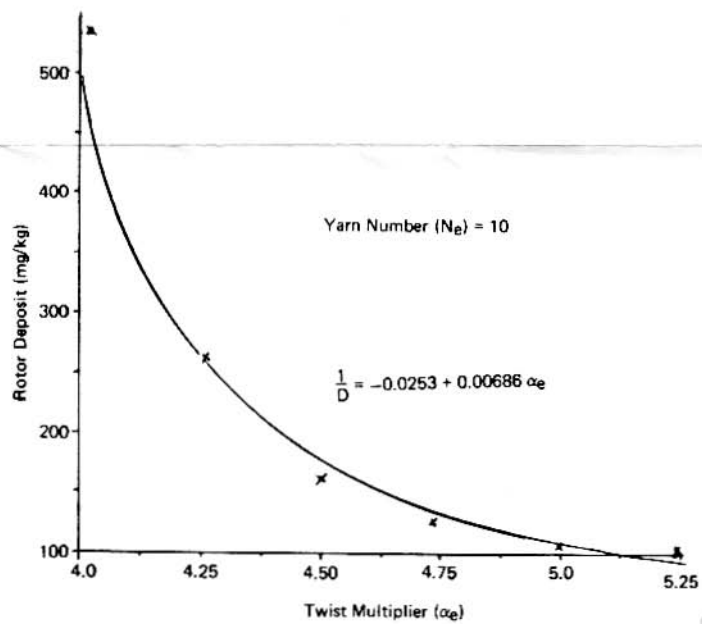


FIGURE 4: INFLUENCE OF YARN TWIST ON ROTOR DEPOSIT



The rate of deposit accumulation in the rotor groove at spinning is not constant but varies with time, as shown in Figure 2. These data were obtained using the standard rotor profile of the BD 200M and stress the importance of spinning for a specified time period when performing a dust study. The variation with time may be non-linear, tending to approach an equilibrium condition in which both the rotor deposit accumulation rate and the rate of dust removal from the rotor by the yarn are constant. The results also imply that the ability of the yarn to remove dust is better when the rotor is clean.

Rotor deposit studies at the Textile Research Center have shown that the rate of deposit accumulation increases linearly with yarn number. This can be seen in Figure 3, where the amount of accumulation increases with yarn number. Or, stated in another way, finer yarns leave more dust in the rotor. (An earlier study on this was reported in *Textile Topics* in June 1976. This was Volume IV, No. 10.)

Figure 4 presents the influence of yarn twist on rotor deposits. As the twist is increased, less dust remains in the rotor, while lower twist may permit a sizeable accumulation to remain. Additional information can be found in *Textile Topics* Volume III, No. 11 (July 1975).

We hope the information presented here will be of interest and value to those who receive *Topics*. The final portion of this report will be presented in the October issue. This research is supervised by John B. Price with assistance from William D. Cole and Albert Esquibel.

VISITORS Visitors to the Textile Research Center during September included Griff T. Neumeyer, Southeastern Cotton Sales, Spartanburg, SC; James C. Rogers, Mount Vernon Mills, Williamston, SC; Patrick Enniss, Thorneburg Hosiery Co., Inc., Statesville, NC; Charles House, Hewlett Packard, Palo Alto, CA; James E. Reynolds, Basagene, Inc., New York, NY; Roger Bolick and Linley Jones, Allied Plastics & Fibers, Hopewell, VA; Kevin Tow, Allied Plastics & Fibers, Columbia, SC; Bob Cortach and Greg Preston, USDA, Austin, TX; Allan M. Kerr and R. (Bob) Green, Bradmill Textiles, Yarraville, Victoria, Australia; and Ajchara Chayavasan, Numchai Industry Co., Bangkok, Thailand.

In addition, 50 students from Texas Tech University's Department of Agricultural Economics, and 18 students from South Plains College in Levelland, Texas visited the Center during the month.

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