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AN EVALUATION OF BURCKHARDT ROTOR COMPONENTS

The trend today is for textile mills which produce yarn by open-end spinning to use smaller diameter rotors in the production of those yarns. Smaller rotors can be run at higher speeds, increasing productivity and decreasing the mills' costs. The International Center for Textile Research and Development recently conducted a study comparing Burckhardt-manufactured small diameter rotors and twist traps with rotor components produced by Schlafhorst in an attempt to identify the benefits, if any, in rotor-spinning performance and yarn properties obtained by the use of smaller rotors. In this issue of *Textile Topics* we are presenting a summary of that study.

Knitting yarns size Ne 30/1 with a range of twist levels from 3.20 to 4.04 were spun using Schlafhorst torque stops, Burckhardt twist traps and rotors manufactured by both companies, in various component combinations. The components were used with and without a 1.5 mm washer beneath the navel. Use of the washer lifts the navel toward the [face of] the rotor to increase twist in the yarn as it exits the rotor through the torque stop or twist trap.

The various components, and the combination in which they were used, had an effect on the successful production of the yarns. Rotor component combinations were run at rotor speeds ranging from 100,000 to 130,000 rpm. However, only the Burckhardt rotor in combination with the torque stop or the twist trap could be run at 120,000 and 130,000 rpm; the Schlafhorst rotors could not be run at the higher speeds due to a speed limitation of 110,000 rpm.

The best component combination when spinning at 100,000 and 110,000 rpm was the Schlafhorst T231D rotor with the Burckhardt twist trap (Figure 1). This rotor was more successful in spnning Ne 30/1 yarn than either the Schlafhorst G231D or the Burckhardt BA 29.5 YG, due to the geometry of each rotor. The Schlafhorst T231D and G231D rotors are the same diameter size but there are differences in the surface shape of the grooves. The T231D rotor has a tight T-shaped angle, whereas the G231 D has a more curved G-shaped angle. With the T231D rotor, less contamination collected in the groove to cause yarn breaks, resulting in a low break rate and good yarn strength when spinning at 110,000 rpm with this rotor. The break rate increased dramatically and yarn strength decreased when spinning with a Schlafhorst G231D or a Burckhardt BA 29.5 YG rotor. The Burckhardt 29.5 YG is a smaller rotor size with a groove shape similar to the Schlafhorst G231D (curved G-shaped angle). The curved groove allowed for more contamination to be collected, causing an increase in yarn breaks.

As mentioned previously, only the Burckhardt rotor would permit spinning at speeds above 110,000 rpm. The higher rotor speeds influenced both the number of breaks occurring and the yarn strength (the higher the rotor speed, the fewer yarn breaks occurred). Table I on the next page shows that when spinning at 110,000 rpm there were an excessive number of yarn breaks, although yarn strength was relatively good. As the rotor speed increased from 110,000 to 130,000 rpm, break rate dropped dramatically with, however, a decrease in yarn strength.

At 130,000 rpm the Burckhardt BA 29.5 YG rotor

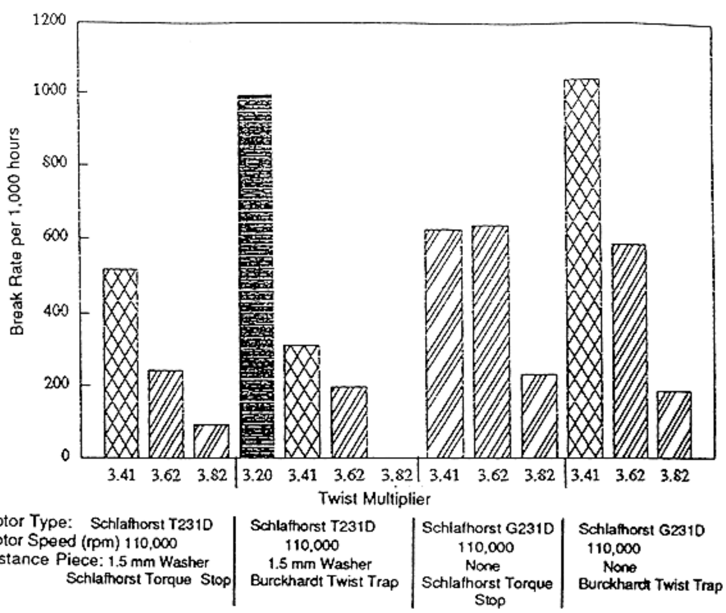
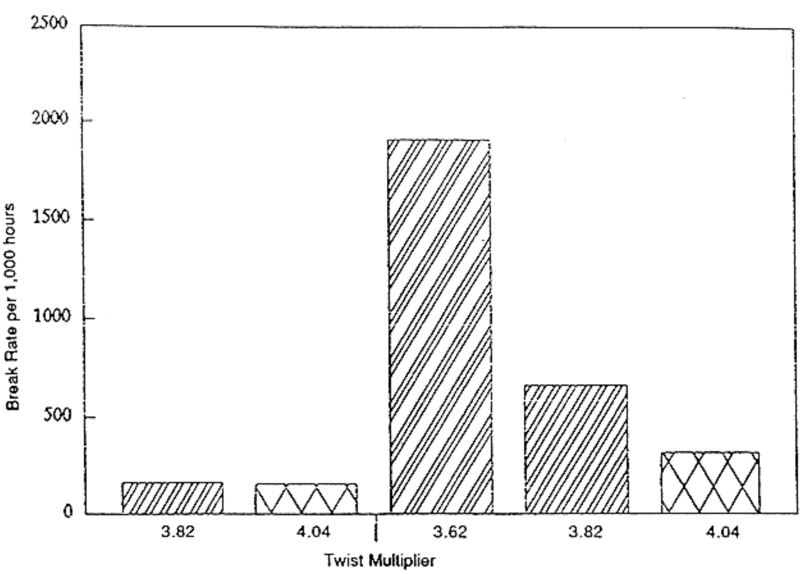


FIGURE 1: BREAK RATE AGAINST TWIST MULTIPLIER (Schlafhorst rotors)

TABLE I: ROTOR SPINNING TRIAL RESULTS (Burckhardt BA 29.5 YG rotor)

Rotor Type:	Burckhardt 29.5 YG		
Rotor Speed (rpm)	110,000	120,000	130,000
Distance Piece:	None Burckhardt Twist Trap		
SLIVER	53 gr/yd Finisher Drawframe		
Machine	Schlafhorst Autocoro SE 9		
Nominal Yarn Number (N_e)	30/1		
Rotor Type	29.5 YG		
Rotor Speed (rpm)	110,000	120,000	130,000
Opening Roller Type	B 174 DN		
Opening Roller Speed (rpm)	7500		
Draft	189.7		
Twist Multiplier (α_e)	4.04		
Yarn Speed (yd/min)	138.0	150.5	163.1
Navel	KN 4 + 0 + TT		
Ambient Conditions	72°F/55% RH		
Test Duration (Rotor hours)	22.83	20.47	19.32
YARN PROPERTIES			
Skein Test:			
Yarn Number (N_e)	30.12	29.99	29.86
CV% of Count	0.89	0.91	0.63
Count-Strength-Product	2136	2103	2068
CV% of CSP	4.0	5.0	5.6
Single Yarn Tensile Test:			
Tenacity (g/tex)	14.02	13.32	13.06
Mean Strength (g)	274.7	262.6	258.1
CV% of Strength	7.74	10.41	9.62
Elongation (%)	4.90	4.39	4.13
CV% of Elongation	6.82	7.87	8.16
Spec. Work/Rupture (g/tex)	0.347	0.305	0.287
CV% of Work of Rupture	14.49	16.18	16.16
Initial Modulus (g/tex)	271	269	320
Uster Evenness Test:			
Non-Uniformity (CV%)	16.11	16.45	17.09
Thin Places/1,000 yds	103	126	183
Thick Places/1,000 yds	117	185	270
Neps/1,000 yds	366	547	779
ASTM Yarn Grade	B+	B+	B
PERFORMANCE:			
Number of Breaks	78	18	6
Break Rate/1,000 rotor hrs.	3417	864	311



Rotor Type: Burckhardt 29.5 YG
Rotor Speed (rpm): 130,000
Distance Piece: None
Schlafhorst Torque Stop | Burckhardt Twist Trap

FIGURE 2: BREAK RATE AGAINST TWIST MULTIPLIER (Burckhardt rotors)

and the Schlafhorst torque stop exhibited the most constancy. Break rate and yarn strength remained constant with increased twist multipliers. At this speed the break rate was excessively high when using the Burckhardt twist trap (Figure 2).

The Schlafhorst torque stop and Burckhardt twist trap were used interchangeably with Schlafhorst and Burckhardt rotors. Overall, the Burckhardt twist trap showed the best performance at all rotor speeds except 130,000 rpm, where the Schlafhorst torque stop showed the best results. The shape of the Burckhardt twist trap, which is slightly curved, allowed for a more smooth and even path for the yarn enroute to the package as it exited the rotor.

We extend sincere thanks to Burckhardt America for the loan of the rotor components used in this study. This project was sponsored by the Texas Food and Fibers Commission. The report was written by Cay Amason and edited for *Textile Topics* by Harriet Boone. A copy of the complete report may be requested by contacting us at the address given on the back page of *Topics*.

TEXAS TECH GRAD JOINS COTTON INCORPORATED

Texas Tech University textile engineering graduate Mike Rodriguez has been appointed to the new position of Manager of International Marketing for Cotton Incorporated in Raleigh, North Carolina. He will report to Dean B. Turner, vice president, International Marketing in New York.

Rodriguez will be responsible for Cotton Incorporated activities in Mexico and the rest of Latin America as they develop. In addition, he will be involved in all other international activities and follow-up as needed related to technical issues.

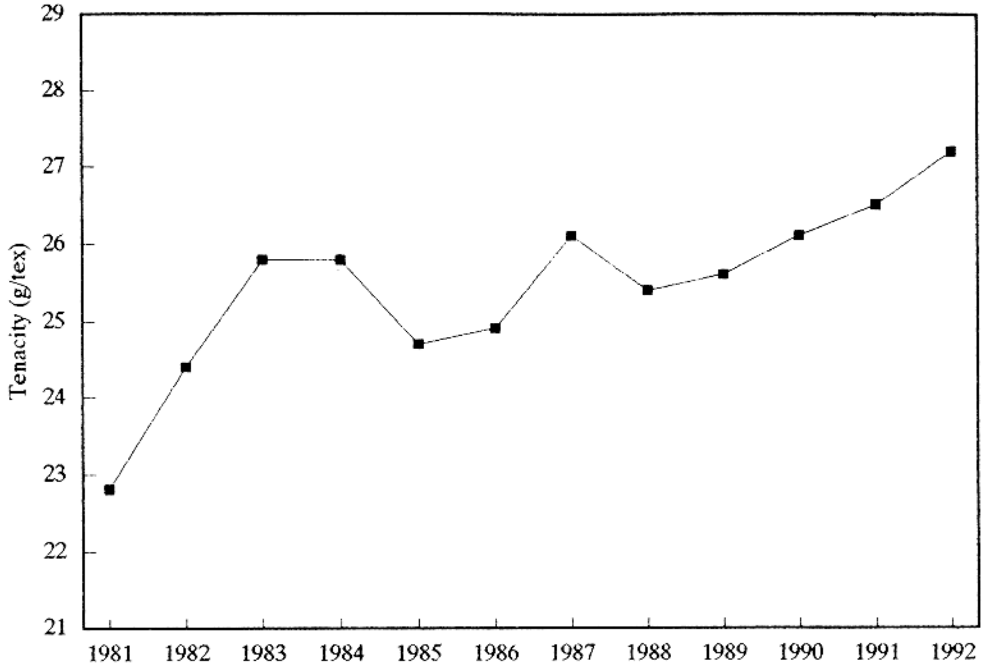
He has extensive fiber and yarn processing experience, having worked at Schlafhorst Inc., WestPoint Pepperell, Lorenzo Textiles and here at the International Center for Textile Research and Development.

We congratulate Mike Rodriguez as he assumes his duties with Cotton Incorporated.

IMPROVEMENT IN COTTON STRENGTH ON THE TEXAS HIGH PLAINS

The Texas A&M University Experiment Station at Lubbock, Texas, began the Plains Cotton Improvement Program in 1983. This program is designed to meet the needs of cotton producers on the Texas High Plains by improving and developing new strains of cotton for this region. One aspect of this program is increased emphasis on fiber strength. Due to the limited growing season here, and competition with other cotton-producing regions in the U.S. where the fiber has generally higher strength, improvements in new cotton varieties were urgently needed.

FIGURE 1: FIBER STRENGTH FOR THE TEXAS HIGH PLAINS 1981 TO 1992



Source: USDA Cotton Quality Reports

Improvement in the fiber strength of High Plains cotton is evident in the USDA's Cotton Quality Reports for the last twelve years. HVI testing performed on these cotton crops shows a continual increase in fiber strength. As shown in the graph, there have been years when the High Plains cotton strength decreased slightly, due to growing conditions, but the overall trend is for high strength.

Emphasis on cotton fiber strength is promoting the use of HVI technology among all aspects of the textile industry – cotton breeders, producers, merchants and textile mills. Increased usage of open-end (rotor) spinning equipment has influenced the use of HVI systems in the mills. The most important fiber quality in open-end spinning of high-quality yarns is strength. By use of High Volume Instruments, textile mills can ensure more uniform laydowns that result in consistently better yarns.

High Volume Instrument (HVI) testing is a cotton classification system used worldwide that is capable of testing the major fiber properties (length, length uniformity, strength, elongation, micronaire, trash and color) in large volumes at a high rate of speed with excellent and efficient results. The complete classing of cotton using the HVI system was begun at the USDA classing facility in Lamesa,Texas, in 1980. That year, 306,000 bales of cotton were classed by HVI. Today the entire U.S. cotton crop is classed on the HVI system, with premiums being paid on fiber strength.

NATURAL FIBER TEXTILE PLANT

Herb Wright of Wright Fibers Inc. and Moore Development of Big Spring Inc. have announced plans to open a natural fiber textile plant in Big Spring, Texas, in the near future. Some of the procedures developed at the International Center for Textile Research and Development will be used at the plant.

Among these will be a cleaning process for retrieving cotton lint left in cotton-ginning waste. These fibers will be used for making 100% cotton bale bags. Cotton bale bags are cleaner than the polypropylene bags used today, and could reduce cotton-cleaning costs. With cotton bales wrapped in cotton, the amount of damage to machinery and contamination to fiber if parts of the bag were to be accidentally shredded would be minimized.

With demand for natural fibers increasing, Wright Fibers also will be knitting all-cotton and cotton/wool blend fabrics for pants and skirts. The cotton/wool blend known as TEXCELLANA was developed at the Texas Tech University International Center for Textile Research and Development and at present is not widely marketed.

We wish Wright Fibers Inc. and Moore Development for Big Spring Inc. much success in this venture.

VISITORS

Visitors to the Center during March included Mark Hampton and Don Compton, Mission Valley Mill, New Braunfels, TX; Barbara Shaeffer, Motion Control Inc., Dallas, TX; Carlos E. Baresch and Leonardo Duarte, Protela, Bogota, Colombia; Herb Wright, Wright Fibers Inc., Decatur, TX; Virginia Belew, Lydia Rey, Chris Churchwell, Charla Lewis, Danette Toome and Esther Lopez, Big Spring, TX; and Tom Stanton, Midland, TX.

Groups coming for tours of the Center included 35 students from the Agricultural Economics Department at Texas Tech University; 55 students from Lamesa High School, Lamesa, TX; and 32 from Plains High School, Plains, TX.