TRC

TEXTILE TOPICS

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

Volume XIII, No. 9
May 1985

RESEARCH ON OPEN-END SPINNING In 1984 the Textile Research Center began a study to determine the most suitable design of pinned opening rollers when rotor-spinning 100% cotton. The program involved several different machines, and the data obtained resulted in a rather lengthy report. One of the interesting findings, and a relatively small portion of the total program, involved our Suessen Spintester that is equipped with SPE 6/8 spinboxes. We are including the results from that portion of the program in this issue of *Textile Topics*.

As background, we would like to mention that wire-wound opening rollers were mostly utilized on the earliest open-end spinning machines. Designs were changed depending on whether cotton, man-made fibers or blends were being processed. The Rieter Machine Works was believed to be the first to utilize a pinned opening roller, which was satisfactory in its performance with most fibers. Other machines were similarly equipped at a later date, although the design of opening roller in terms of number, arrangement and type of pin differed from that used by Rieter.

In successful applications, pinned opening rollers have generally been shown to give more intensive opening action, which manifests itself in lower operational speeds than comparable wire-wound opening rollers. The reduced speed is believed to extend bearing life and reduce power consumption. The more intensive action may also result in better fiber separation, which in turn would give a more even yarn with improved tensile properties. Unfortunately, this has not been a universal achievement when processing cotton.

The cotton selected for this program was first tested on a Motion Control HVI system. The results of this evaluation are as follows:

Micronaire	3.5
UHM Length (in)	1.02
Uniformity Ratio (%)	79
Strength (1/8'' gg)(g/tex)	25.0
Elongation (%)	5.9

Following fiber evaluation, the cotton was processed through a standard opening line with chute feeds to cards that were operating at 50 pounds/hour. After two processes of drawing, 60 gr/yd sliver was fed to the Suessen Spintester which was equipped with opening rollers having pins positioned at varying forward angles. The exact angle is not identified in this report, and the opening rollers are listed as BC13, BC12, BC9, BC11 and BC10. Although it appears these numbers are not given in proper sequence, they are listed according to the forward angle of the pins, with the angle increasing as the numbers are given here. Tables I through IV, and Graphs 1 and 2 (see following pages), give the same sequence.

Four yarn numbers were spun for each of the five different opening rollers. These were N_e 6, 10, 16 and 22. All were spun at an opening roller speed of 4,000 rpm with a twist multiplier of 4.8. Spinning was done with smooth navels and ambient conditions of 72°F and 56% RH. The rotor type was 46 mm YS and rotor speed was 50,000 rpm for all yarns.

We feel this may be of interest to some of our friends who spin cotton with open-end machines, for there is often a desire to produce yarns with the greatest possible strength and lowest variation. This study was sponsored by the Natural Fibers & Food Protein Commission of Texas and was conducted at Texas Tech University by John B. Price, head of TRC's research on new spinning technologies, Karen S. Hansen, William D. Cole and Albert Esquibel. At the time this program was conducted, Miss Hansen was a senior in the Department of Textile Engineering. She is now employed by American Schlafhorst Company in Charlotte, North Carolina. We wish to thank NFFPC for permitting us to reproduce this information and Wm. Stewart & Son (Hacklemakers), Dundee, Scotland, for providing the opening rollers.

TABLE I

Nominal Yarn Number (N_e)	6/1				
Opening Roller Type	BC13	BC12	BC9	BC11	BC10
Actual Yarn Number (N_e)	5.94	5.79	5.99	5.85	5.89
CV% of Count	0.3	0.9	0.8	0.3	0.6
Count-Strength-Product	1655	1944	2108	2125	2105
CV% of CSP	2.4	2.4	1.9	1.8	2.9
Tenacity (g/tex)	11.11	12.02	12.82	12.19	12.55
Mean Strength (g)	1104	1226	1263	1230	1258
CV% of Strength	9.3	5.8	5.3	5.1	5.7
Elongation (%)	8.37	9.24	8.99	9.45	9.30
CV% of Elongation	7.2	4.9	5.0	3.9	4.6
Non-Uniformity (CV%)	25.56	17.75	14.89	13.98	13.89
Thin Places/1,000 yds	604	24	2	2	2
Thick Places/1,000 yds	896	314	123	78	101
Neps/1,000 yds	402	156	78	68	55
Hairs/100 yds	977	860	954	943	1117

TABLE II

Nominal Yarn Number (N_e)	10/1				
Opening Roller Type	BC13	BC12	BC9	BC11	BC10
Actual Yarn Number (N_e)	9.92	9.78	9.52	9.76	9.76
CV% of Count	0.6	0.5	0.8	0.9	0.5
Count-Strength-Product	1506	1803	1959	2015	2015
CV% of CSP	1.6	2.6	2.1	2.8	2.8
Tenacity (g/tex)	10.25	11.67	12.07	12.14	12.57
Mean Strength (g)	610	704	749	738	760
CV% of Strength	11.1	6.5	7.5	5.8	5.8
Elongation (%)	7.84	8.71	8.60	9.09	9.06
CV% of Elongation	6.8	5.4	5.7	4.6	4.8
Non-Uniformity (CV%)	28.87	19.18	16.95	14.61	14.41
Thin Places/1,000 yds	1178	91	17	6	1
Thick Places/1,000 yds	1104	396	188	60	77
Neps/1,000 yds	1160	298	148	58	61
Hairs/100 yds	565	409	530	602	602

TABLE III

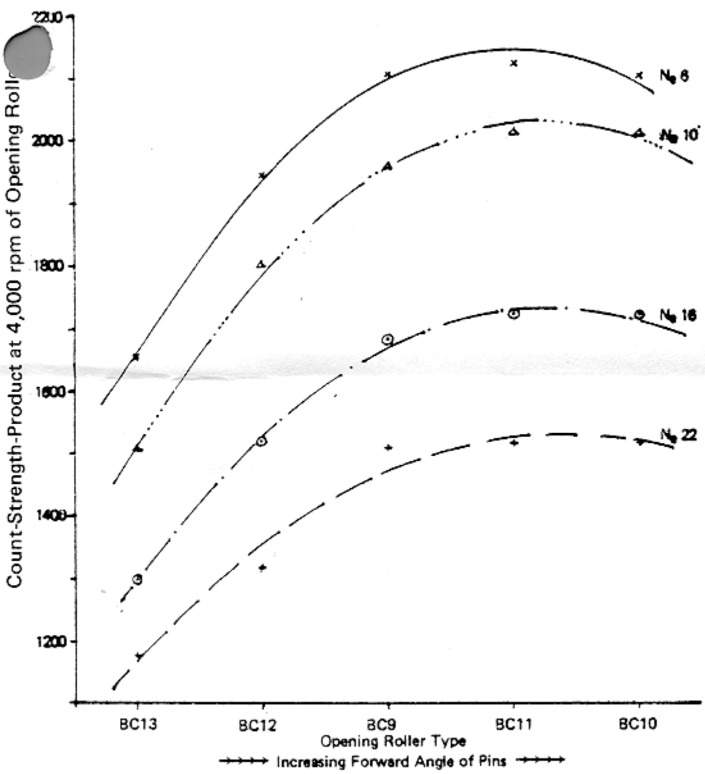
Nominal Yarn Number (N_e)	16/1				
Opening Roller Type	BC13	BC12	BC9	BC11	BC10
Actual Yarn Number (N_e)	16.03	15.56	15.57	15.59	15.50
CV% of Count	1.4	0.6	0.5	1.0	1.1
Count-Strength-Product	1297	1519	1683	1723	1722
CV% of CSP	3.7	1.7	1.5	2.8	3.3
Tenacity (g/tex)	9.90	10.80	11.29	11.34	11.48
Mean Strength (g)	365	410	428	429	437
CV% of Strength	11.9	9.3	8.4	7.0	8.0
Elongation (%)	7.35	7.84	8.27	8.05	8.08
CV% of Elongation	8.1	6.4	6.7	6.0	6.0
Non-Uniformity (CV%)	28.50	22.97	17.57	15.16	15.31
Thin Places/1,000 yds	1949	490	62	6	15
Thick Places/1,000 yds	1209	722	272	117	99
Neps/1,000 yds	1859	1106	285	155	116
Hairs/100 yds	363	296	307	280	335

TABLE IV

Nominal Yarn Number (N_e)			22/1		
Opening Roller Type	BC13	BC12	BC9	BC11	BC10
Actual Yarn Number (N_e)	21.84	22.01	22.04	21.40	21.17
CV% of Count	0.6	0.9	0.8	0.8	0.6
Count-Strength-Product	1177	1314	1508	1517	1518
CV% of CSP	4.0	2.9	1.7	2.8	2.8
Tenacity (g/tex)	9.35	9.73	10.60	10.52	10.37
Mean Strength (g)	253	261	284	291	289
CV% of Strength	12.5	11.3	9.5	8.4	7.8
Elongation (%)	6.60	6.73	7.34	6.87	6.93
CV% of Elongation	9.2	9.3	7.7	7.3	7.1
Non-Uniformity (CV%)	30.88	23.07	18.55	16.61	16.12
Thin Places/1,000 yds	2190	618	145	66	35
Thick Places/1,000 yds	1233	684	345	198	178
Neps/1,000 yds	1909	1046	359	28	247
Hairs/100 yds	301	268	245	230	212

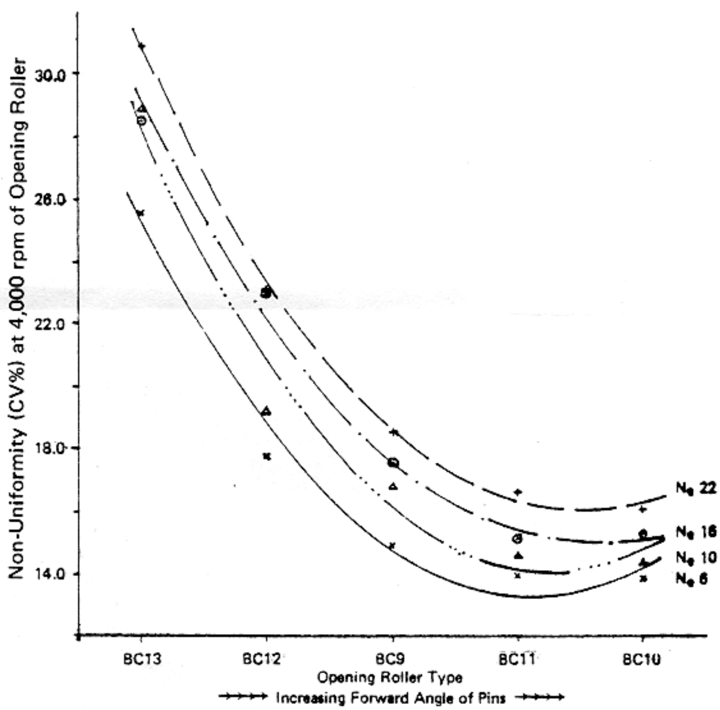
GRAPH 1

INFLUENCE OF FORWARD ANGLE OF PINS ON YARN STRENGTH AT LOW SPEED



GRAPH 2

INFLUENCE OF FORWARD ANGLE OF PINS ON YARN NON-UNIFORMITY AT LOW SPEED



TEXTILE ENGINEERING DEPARTMENT: STUDENT AWARD In last month's edition of *Textile Topics*, we made note of several awards given to seniors graduating in Textile Technology and Management at Texas Tech University. We mentioned that Joe Don Long of Lubbock had received the L. E. Parson's Award, a special honor given each year to the senior with the highest grade point average. Since that announcement was made, we have learned that Joe Don is also the recipient of the Textile Veteran's Award. This award, from the Textile Veteran's Association of New York, is a medallion engraved with the name of the recipient and a $200 United States Savings Bond.

Since entering this department four years ago, Long has been an outstanding student. He completed all of his studies with high grades and used summer vacations for employment with WestPoint Pepperell, New Braunfels, Texas, and the American Cotton Growers' Textile Division, Littlefield, Texas. He has been accepted at the Institute of Textile Technology, in Charlottesville, Virginia, and will begin graduate studies there in September 1985. We are pleased to have had Joe Don as one of our students. We believe his career in textiles will continue to be as outstanding as it has been as a student at Texas Tech University.

VISITORS Visitors to the Textile Research Center during May included Morton Glick, Celanese Research Co., Summit, NJ; Paul E. McMahon, Celanese Specialty Operations, Chatham, NJ; George A. Muller and Frank Fulton, Firestone Fibers and Textiles Company, Hopewell, VA; Michael T. Hoffman, Manville Building Materials Corp., Waterville, OH; S. B. Spencer, Manville Service Corp., Denver, CO; Val Wilke, Sid Richardson Foundation, Fort Worth, TX; Ding Jingfan, Consulate of the People's Republic of China, Houston, TX; Chen Kai-Chu, Lei Zhen-Lin, Li Ming and Huang Boz-Quan, Peking, People's Republic of China.