TEXAS TECH UNIVERSITY

TEXTILE TOPICS

INTERNATIONAL CENTER FOR TEXTILE RESEARCH AND DEVELOPMENT

LUBBOCK, TEXAS / U.S.A.

Vol. XXI, Nos. 3/4 December 1992/January 1993

EVALUATION OF THE RIETER B1 UNICLEAN MACHINE: Part 3 (Conclusion)

In the August/September 1992 issue of *Textile Topics* we introduced and reported results from work conducted with the use of the Rieter B1 Uniclean machine in the opening line. The study was devoted to assessing the performance of the B1 Uniclean relative to that of the Monocylinder in the processing of short, long and extra-long staple cotton.

In the October/November issue we reported the results when using medium, long and extra-long staple cottons. In this final part of the series results from evaluating the use of more aggressive rolls (beaters) in the ERM cleaning machine and the effectiveness of the B1 Uniclean as a dust cleaner will be reported.

Evaluation of ERM Cleaning Rolls (beaters)

Cottons from two bales of comparable levels of contamination to those of the eight bales used to optimize the spinning room machinery and the Uniclean machine (see *Textile Topics* Vol XX, No. 12/Vol XXI, No. 1) were used to evaluate the effect of utilizing more aggressive beaters in the ERM machines. This entailed evaluating the use of R10/10 and R5.1/12 beaters in various combinations. For most of the study, the second ERM was equipped with the most aggressive cleaning roller (R5.1/12).

TABLE I

WASTE DATA

CLEANING MACHINE SPECIFICATIONS					
ERM 1					
Feed Roll Setting	---	2.2	2.2	2.2	2.2
Cleaning Roll Type	---	R20/10	R10/10	R10/10	R10/10
Cleaning Roll Speed (rpm)	---	820	820	950	950
ERM 2					
Feed Roll Setting	3.0	3.0	3.0	3.0	1.0
Cleaning Roll Type	R5.1/12	R5.1/12	R5.1/12	R5.1/12	R5.1/12
Cleaning Roll Speed (rpm)	950	950	950	950	950
	209	213	210	211	212
CLEANING POINT					
BLOWROOM					
B1 Uniclean	2.10	2.13	2.27	2.25	1.94
ERM 1	---	2.84	2.41	2.38	2.49
ERM 2	2.75	2.00	2.07	1.94	1.91
CARD					
Undercard	3.00	2.41	2.62	2.41	2.62
Filter	6.30	2.68	3.81	3.60	4.12
TOTALS					
Blowroom	4.84	6.98	6.75	6.57	6.35
Card	9.30	5.09	6.44	6.01	6.74
OVERALL TOTALS	14.14	12.07	13.19	12.58	13.09

The waste results are seen in Table I at left below. Waste was collected and weighed in the same manner as before. Omission of the first ERM caused an increase in the quantity of trash normally extracted at the second ERM, since it was essentially acting as the first machine. The reduction of three major cleaning points to two in the blowroom placed an increased burden of cleaning onto the card, where an increase in waste was detected. (the filter waste appears to be abnormally high.)

Spinning evaluations were conducted on a reference sample produced from cotton formed of the blend of eight bales used in earlier studies. Another sample was produced incorrectly at a lower lickerin speed than desired, as well as a different beater roll in the second ERM. All samples were spun into Ne 26/1 yarn with a twist multiplier of 4.0. Yarn properties were determined on initial and final yarn samples.

Table II (on page 2) shows the breakage analysis data. The use of the first ERM with an R20/10 roll improved the breakage rate at rotor spinning by reducing the number of trash-related breaks by almost half. Replacement of the cleaning rolls of the first ERM by a more aggressive roller did not provide an improvement in the quantity of material ejected as waste. The breakage rate at spinning was noticeably worse due to the higher numbers of trash- and entanglement-related breaks.

When the first ERM was operated at a higher cleaning roll speed of 950 rpm, there was no noticeable increase in waste extractions or reduction in the trash-related breaks at spinning. The reduction of the entanglement-related breaks, however, provided a reduction in the overall number of breaks.

The final member of the series was produced by reducing the feed roll-to-cleaning roll distance from 3.0 to 1.0 mm, retaining the cleaning roll speeds at their maximum in both ERMs. Again, there was no change in the quantity of waste extracted or in the number of trash-related breaks, but a further reduction in entanglement-related breaks was seen.

When the breakage rate data are viewed together, it can be seen that the number of trash-related breaks was minimal at a seemingly gentler specification (i.e. use of the R20/10 roll instead of the R10/10 roll in the first ERM machine). It could be that the finer roll was reducing the tuft size too much, so that the R5.1/12 roll was rendered ineffective. The number of entanglement-related breaks reduced as the action of the first ERM was made more aggressive.

The yarn property data failed to show consistent trends with changes in the number and specifications of the ERM machines which were used. It would appear that the use of more aggressive cleaning rollers in the ERM machines did not have a significant effect on the quality of rotor yarns spun from shorter cottons.

Two additional samples were run, using the original mix of eight bales. Unfortunately, an error was made in setting the card, so the two lots are not directly comparable. The specifications are seen in Table III. One sample was run at the optimized settings except that a lower lickerin speed of 1134 rpm was used. The use of a more aggressive cleaning roll and a higher lickerin speed in the production of the second sample resulted in increased waste. When examining the spinning performance data (Table II), it can be seen that the more aggressive cleaning resulted in a significant reduction in trash-related breaks although there was an apparent increase in entanglement-related breaks.

Table III also permits a comparison of the two stocks used involving the Uniclean machine. The data shows that a lower quantity of filter waste was produced at the card with the two-bale mix.The spinning data shows a significant difference in trash-related breaks presumably brought about by the use of higher lickerin speed.

Dust Study

To assess the effectiveness of the Uniclean machine as a dust remover, two samples were prepared. One sample was processed via the

TABLE II

ROTOR SPINNING BREAKAGE ANALYSIS

Sample Reference	208	209	210	211	212	213	216
Number of Rotors	24	24	24	24	24	24	24
Total Rotor Hours	200.4	200.4	200.4	200.4	200.4	200.4	200.4
Package Length (km)							
Total Weight Spun (lb)	67.31	67.31	67.31	67.31	67.31	67.31	67.31
Sliver Causes							
Break, Discontinuity							
Exhausted							
Jammed in Condenser							
Piecing							
Thin Places							
Total, Sliver Causes	0	0	0	0	0	0	0
Spinning Causes							
Bark	30	24	24	24	25	14	65
Seed Coat Fragment	0	0	0	0	0	0	0
Trash	0	0	0	0	0	0	0
Total Trash-related	30	24	24	24	25	14	65
Nep	0	0	0	0	0	1	2
Slub	36	35	43	37	26	33	25
Slub with Yarn in Rotor	2	1	3	0	0	1	0
Trashy Slub	0	2	2	2	5	0	2
Total Entanglement-related	38	38	48	39	31	35	29
Unknown	1	0	2	0	0	4	2
Yarn in Rotor	0	0	1	0	0	0	0
Total Unknow	1	0	3	0	0	4	2
Total Spinning Causes	69	62	75	63	56	53	96
Uninspected Breaks	1	3	0	2	2	1	3
Non-spinning Causes							
Foreign Matter	1	6	1	0	0	0	1
Mechanical							
Take-up-high Tension							
Operative-induced							
Total Non-spinning Causes	1	6	1	0	0	0	1
Proportion Trash-related	43.5 %	38.7 %	32.0 %	36.9 %	44.6 %	25.9 %	67.7 %
Proportion Entanglement-related	55.1 %	61.3 %	64.0 %	60.0 %	55.4 %	64.8 %	30.2 %
Proportion Unknown	1.4 %	0.0 %	4.0 %	3.1 %	0.0 %	7.4 %	2.1 %
Total Spinning & Uninspected	70	65	75	65	58	54	99
per 1000 Rotor hrs.	349	324	374	324	289	269	494
per 1000 lbs.	1040	966	1114	966	862	802	1471
Total Interruptions (all counts)	71	71	76	65	58	54	100
per 1000 rotor hours	354	354	379	324	289	269	499

TABLE III

WASTE DATA

Cotton Blends	2207 – 2214		2206 – 2215		
CLEANING MACHINE SPECIFICATIONS					
ERM 1					
Cleaning Roll Type	R20/10	R 20/10	R20/10	R20/10	R20/10
Cleaning Roll Speed (rpm)	820	820	820	820	820
ERM 2					
Cleaning Roll Type	R10/10	R5.1/12	R5.1/12	R10/10	R10/10
Cleaning Roll Speed (rpm)	950	950	950	950	950
CARD					
Lickerin Speed (rpm)	1134	1507	1507	1507	1507
Cylinder Speed (rpm)	450	450	450	450	450
	216	208	213	214	215
CLEANING POINT					
BLOWROOM					
B1 / Monocylinder*	2.33	1.64	2.13	2.02	2.06*
ERM 1	2.90	2.78	2.84	2.52	2.51
ERM 2	1.66	2.21	2.00	2.10	2.11
CARD					
Undercard	2.35	2.39	2.41	2.67	2.59
Filter	3.04	5.01	2.68	5.80	4.25
TOTALS					
Blowroom	6.89	6.63	6.98	6.64	6.69
Card	5.40	7.41	5.09	8.46	6.84
OVERALL TOTALS	12.28	14.03	12.07	15.10	13.52

B1Uniclean machine, and another sample was treated with the Monocylinder machine using the blowroom and card at the optimized settings. The "two-bale mix" was used.

After drawing twice, the sliver was fed to a BD200M rotor machine. Using the normal conditions for conducting a dust study (i.e. the production of Ne 10/1 at 36/000 rpm with a twist multiplier of 5.0) the detritus was carefully removed from 20 rotors which had been used to spin yarn for four hours each. The collected dust was then weighed and expressed in terms of the total weight of yarn spun.

The data in Table III show the specifications used to prepare the two lots, one via the B1 Uniclean machine, the other with the Monocylinder. The Uniclean machine was run at the optimized setting of a "cleaning intensity" (roll speed) of 0.7 and "waste amount" (grid bar setting) of 8. The waste data, also seen in Table III, indicates that use of the B1 Uniclean resulted in an increase in waste extracted by the total system.

The results of the dust study performed on the two samples of cotton are shown in Table IV. It is apparent that there is little difference between treatments, although the results favor the use of the B1 Uniclean machine. Whereas the groove deposits are very low, the ledge deposits were higher than normal.

TABLE IV

DUST STUDY RESULTS

SPINNING SPECIFICATIONS		
Machine	Elitex BD 200 M	
Rotor Speed (rpm)	36,000	
Opening Roller Speed (rpm)	8000	
Yarn Number (Nominal)(Ne)	10	
Twist Multiplier (Nominal)	5.0	
Test Duration (Rotors x hours)	20 x 4 hrs	
SAMPLE ORIGIN	Uniclean	Monocylinder
Ledge	49.14 mg/kg	50.54 mg/kg
Groove	0.27 mg/kg	0.41 mg/kg
Total Deposit	49.41 mg/kg	50.95 mg/kg

This project was sponsored by the Texas Food and Fibers Commission. The report was written by John B. Price, assistant director of the International Center for Textile Research and Development, prior to his resignation. It was edited for *Textile Topics* by Cay Amason.

We extend a special thanks to the Rieter Corporation for loaning us the B1 Uniclean machine and for the donation of the Hollingsworth Trashmaster, which will be used with the Rieter C4 card in future studies.

ICTRD WELCOMES DR. MONIR GAD

Dr. Monir Gad, a researcher at the Cotton Research Institute in Giza, Egypt, will be doing post-doctoral research at the International Center for Textile Research and Development until September, 1993. Dr. Gad's research will be in "fiber crop technology" with an emphasis on cotton fiber and yarn quality. During his stay at the Research Center, Dr. Gad will be doing extensive research with Egyptian cotton varieties on the HVI system in determining fiber strength measurements and comparing the Egyptian extra-long staple cotton and American Pima cotton in relation to fiber properties. We welcome Dr. Gad to the International Center for Textile Research and Development and to Texas Tech University

TEXAS FOOD & FIBERS COMMISSION MEETS AT RESEARCH CENTER

The Texas Food and Fibers Commission (TFFC) held its annual Industry Advisory Committee Meeting on December 9, 1992 at the International Center for Textile Research and Development. These annual TFFC meetings are held at a different university each year. Representatives from Texas Tech University, Texas A&M University, the University of Texas at Austin and Texas Women's University presented project reviews of current research and project proposals for 1994-1995 to the committee. The Texas Food and Fibers Commission is a major sponsor of research here at the Center and we are grateful for their support.

THOUGHT FOR THE DAY

Learn from the mistakes of others – you can never live long enough to make them all yourself.

VISITORS

Visitors to the Center, in addition to those attending the December TFFC meeting, included Joe Essick, Zellweger Uster, Knoxville, TN; Bob Mackey and Clint Edwards, Burckhardt America, Greensboro, NC; T. Gutierrez, Nortec, Greenville, SC; Carlos E. Valdes and Carlos A. Grisales, Coltejer, Medellin, Colombia; Roger Bolick, Allied Fibers, Hopewell, VA; Mary Jean Shannon, Allied Fibers, Petersburg, VA; Carole Shealy and Larry Sims, Allied Fibers, Columbia, SC; Danny Gilmore, George A. Goulston Co., Monroe, NC; Ron Hershberger, Hydro-Tect, San Antonio, TX; Levi Mast, Hydro-Tect, Montezuma, GA; Ron Hershberger, Hydro-Tect, San Antonio, TX; Levi Mast, Hydro-Tect, Montezuma, GA; and Garrett A. Screws, Jr., Novo Nordisk Bioindustrials Inc., Danbury, CT.

Other visitors included Mr. & Mrs. Don Daumar, Atlanta, GA; Heather and Patsy Schwertner, and Karen and Tracy Binder, Ballinger, TX; Wang Hai Ning and Han Zhendong, Bureau of Fiber Inspection of China, Beijing, People's Republic of China; Li Rui, China State Bureau of Technical Supervision, Beijing, PRC; and Zhang Zhihai, China Huatong/Beijing Huatong, Beijing, PRC.

Also visiting were 22 students from Idalou High School, Idalou, TX, accompanied by their instructor, Celia Wheeler.