TRC

TEXTILE TOPICS

INTERNATIONAL CENTER FOR TEXTILE RESEARCH AND DEVELOPMENT
TEXAS TECH UNIVERSITY / LUBBOCK, TEXAS / U. S. A.

Vol. XX, No. 12/Vol. XXI, No. 1 August/September 1992

EVALUATION OF THE RIETER B1 UNICLEAN MACHINE: Part 1

In our last issue of *Textile Topics* (Vol. XX, Nos. 10/11) we reported the dedication of a new Rieter opening line and combing system at the International Center for Textile Research and Development. As part of the opening line, the Rieter Corporation of Spartanburg, SC, loaned to the ICTRD a new machine based on the principle of the Monocylinder. Named the B1 Uniclean, the machine increased the number of helices in the path of the stock around the beater from three to six. In addition, the casing around the beater was altered to allow airborne dust to be removed and the tufts of stock to be reoriented to present a new aspect to the grid bars below the beater. Roll speeds and grid bar settings could be varied quickly by electronic means. The nature of the pegs on the beater roll were also changed in comparison to those of the Monocylinder and the means of trash removal was made more sophisticated.

One aspiration for the machine was that its improved cleaning potential could be beneficial in either removing bark or in preparing stock in such a manner that subsequent machinery would be more capable of effecting its removal. Furthermore, a comparison of the B1 Uniclean's performance to that of the Monocylinder using stock of different nature was desirable.

This report records the work conducted to assess the performance of the B1 Uniclean relative to that of the Monocylinder in the processing of medium, long and extra long staple cottons. Because we do not have the space to present the full report in one issue, it will be given serial style.

Equal portions of eight bales of medium staple cotton were blended in an attempt to provide lots that were consistent in the nature and level of their contamination. A reference sample was produced for the blowroom and carding machinery at those specifications which were considered to be optimal. This involved the use of a R20/10 beater operating at 820 rpm in the first ERM machine instead of a nose beater running at 950 rpm. Angle bars were removed from both ERM machines to allow trash to be extracted. At the card the use of the Hollingsworth Trashmaster in its recommended manner was preferred as was the use of a higher lickerin speed of 1507 rpm. The sequence of machinery used to process the cotton is seen in the flow chart below.

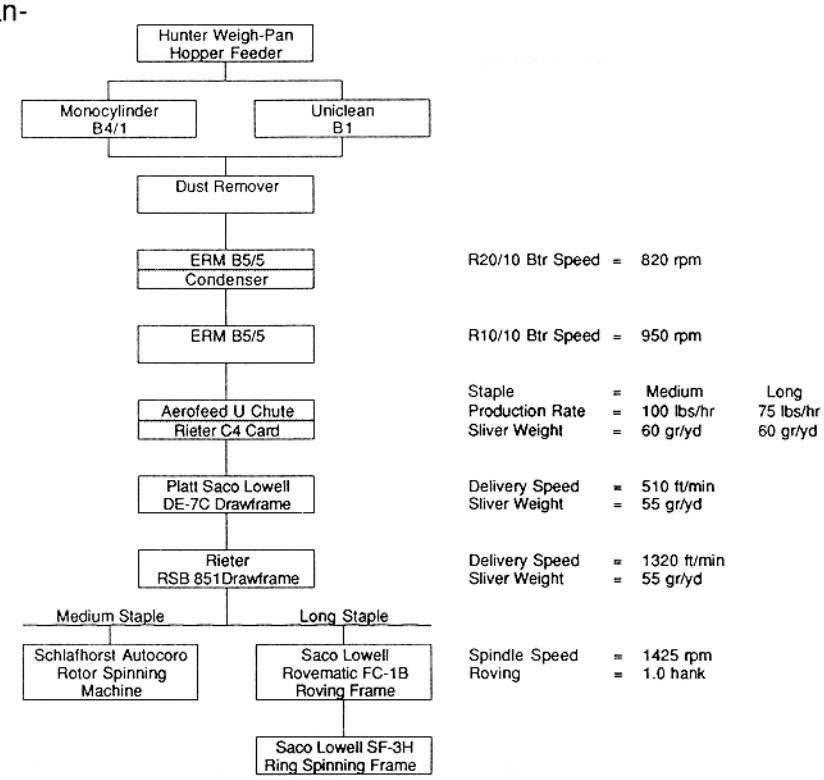

FIGURE 1
OUTLINE OF MECHANICAL PROCESSES

As in previous work, wastes were collected from each major cleaning point, weighed and expressed as a percentage of the total quantity of material collected. The cleanliness of the sliver was assessed in terms of the breakage rate incurred while spinning Ne 26/1 yarn with a 4.0 TM.

Six lots of the 8-bale blend were processed through the B1 Uniclean at different combinations of roll speed (intensity) and grid bar position (waste amount). All other machines were utilized at the setting of the reference sample. When the data were assessed, a setting for the B1 Uniclean was chosen

and an additional sample was produced using the Tandem card.

Table I below shows waste data for the lots treated at various "intensities" and "waste amounts" settings on the Uniclean machine. Also shown are the wastes obtained from lots run through the Monocylinder to be either single- or tandem-carded. In general, the data show that the material extracted by the Uniclean increased as the "intensity" was increased. A change in the "waste amount" produced contrary trends.

The quantity of trash removed by the Monocylinder was of the same order as that removed by the B1 Uniclean when operating at approximately the same speed (Table II). The total quantity of extracted material was also of the same order. Consequently, one is drawn to the conclusion that the redesigned casing and the use of more helical turns around the beater roll have little effect on machine efficiency. Because the B1 Uniclean can be run at higher speeds than the Monocylinder, more waste could be extracted.

TABLE I

WASTE DATA: B1 EVALUATION, MEDIUM STAPLE COTTON

Sample Number	201	202	203	204	206	205	124
Intensity	0.3	0.3	0.5	0.7	1.0	1.0	Mono-
Waste Amount	5	8	8	8	8	10	cylinder
CLEANING POINT							
BLOWROOM							
B1 Uniclean	1.32	1.21	1.44	1.53	1.88	2.20	---
Monocylinder	---	---	---	---	---	---	1.56
ERM 1	2.66	2.82	2.83	2.93	2.93	3.10	2.89
ERM 2	1.61	1.77	1.83	1.34	1.24	1.76	1.60
CARD							
Undercard	2.93	3.03	2.96	2.95	2.88	3.00	3.20
Filter	2.99	6.94	3.35	4.22	2.82	4.10	3.19
TOTALS							
Blowroom	5.58	5.80	6.10	5.79	6.05	7.06	6.06
Card	5.91	9.96	6.30	7.17	5.70	7.10	6.40
OVERALL TOTALS	11.49	15.76	12.40	12.96	11.75	14.17	12.45

TABLE II

WASTE DATA: B1 EVALUATION, MEDIUM STAPLE COTTON

CLEANING SYSTEM	Monocylinder			B1 Unicleaner	
	124	1124		204	1204
CLEANING POINT					
BLOWROOM					
Monocylinder / B1	1.56	1.60		1.53	1.97
ERM 1	2.89	2.73		2.93	3.11
ERM 2	1.60	1.61		1.34	1.44
CARD					
Undercard	3.20	---		2.95	---
	---	7.82		---	9.52
Filter	3.19	---		4.22	---
TOTALS					
Blowroom	6.06	5.94		5.79	6.52
Card	6.40	7.82		7.17	9.52
OVERALL TOTALS	12.45	13.76		12.96	16.05

When processing cotton via the B1 Uniclean, the number of trash-related breaks were at a minimum at roll speeds between 700 and 800 rpm. Over this speed range, the trash-related breaks were slightly less than those obtained when spinning from stock prepared via the Monocylinder. Entanglement-related breaks tended to be slightly less when spinning cottons cleaned with the B1 Uniclean. In terms of the total breakage rate, the best performances were recorded when rotor spinning from single-carded material obtained from stock prepared by the B1 Uniclean operated at speeds in excess of 640 rpm. This is shown in Figure 2.

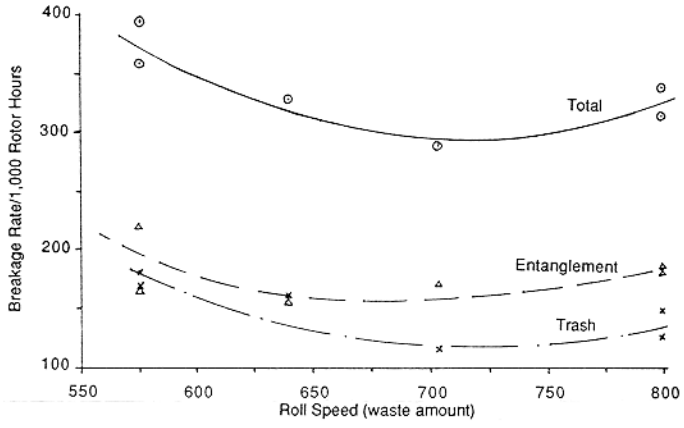

FIGURE 2: INFLUENCE OF ROLL SPEED ON SPINNING BREAKAGE RATE

Table III (on the next page) presents a comparison of the performances of the three optimized blowrooms. These were as follows: first, the original machinery set up; secondly, the installation after performing the trials to maximize cleaning efficiency; and thirdly, the replacement of the Monocylinder with the B1 Uniclean machine. The tabulation also presents results from both single- and tandem-carded stock.

The data clearly show the advantages of using tandem-carded stock, since the number of trash-related breaks were reduced to zero and entanglement-related breaks were of the same order.

There is little apparent difference between yarns from the tandem-carded stock in terms of their properties, degradation with time or spinning performance. Comparing the data with that of yarns spun from single-carded stock, the latter were of higher strength, although the single-yarn tensile data were similar. Yarns from tandem-carded stock showed fewer imperfections, particularly those categorized as neps.

The data show that more waste was removed when being processed via the Tandem card. Despite improvements to the blowroom and single card, the quantity of waste extracted failed to surpass that removed by a system including the Tandem card in conjunction when using the old set-up of blowroom. Improvements in the cleaning system were reflected in reductions in the breakage rate at spinning, but only when the single card was used. The data show that the Tandem card had a profound influence on spinning performance by reducing the number of trash-related breaks to almost zero.

TABLE III

OVERALL INFLUENCE OF OPENING AND CARDING LINES

SAMPLE	101-3	1101-3	124	1124	204	1204
BLOWROOM CARD	Previous Single	Previous Tandem	New Single	New Tandem	Incl. B1 Single	Incl. B1 Tandem
WASTE						
Monocylinder/B1*	1.66	1.66	1.56	1.60	1.53*	1.97*
ERM 1	1.93	1.93	2.89	2.73	2.93	3.11
ERM 2	1.38	1.38	1.60	1.61	1.34	1.44
Blowroom	4.99	4.99	6.06	5.94	5.79	6.52
Undercard	2.30	---	3.20	---	2.95	---
Filter	2.72	---	3.19	---	4.22	---
Total	5.02	8.54	6.40	7.82	7.17	9.52
Overall Total	10.02	13.53	12.45	13.76	12.96	16.05
SPINNING PERFORMANCE						
Break Rate/ 1,000 Rotor hours	526	133	349	175	289	193
Percent Trash-related	72.4	5.0	40.6	0.0	40.4	0.0
Percent Entanglement-related	26.9	95.0	59.4	88.6	59.6	100.0
Percent Unknown	0.6	0.0	0.0	11.4	0.0	0.0
YARN PROPERTIES (Initial)						
Count-Strength-Product	1726	1697	1750	1689	1745	1657
Tenacity (g/tex)	11.06	10.73	10.79	10.85	11.00	11.07
Elongation (%)	6.73	6.20	6.72	6.37	6.78	7.70
CV (%)	15.42	15.00	15.17	14.98	14.94	15.27
Neps/1,000 yds	152	79	127	78	88	78
YARN PROPERTIES (Final)						
Count-Strength-Product	1682	1702	1732	1653	1744	1667
Tenacity (g/tex)	10.81	10.95	10.92	10.93	10.64	10.79
Elongation (%)	6.76	6.67	6.60	6.60	6.51	6.55
CV (%)	15.75	15.48	15.30	15.29	15.29	15.17
Neps/1,000 yds	180	85	133	88	114	83

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.

We extend special thanks to the Rieter Corporation for loaning us the B1 Uniclean and for the donation of the Hollingsworth Trashmaster which will be used at carding with the Rieter C4 in many of our studies.

TEXAS TECH BEGINS SEARCH FOR NEW DIRECTOR FOR INTERNATIONAL CENTER

Texas Tech University has officially launched its search for a new director of the International Center for Textile Research and Development. While no definite timetable has been established, it is anticipated that a new director will be named by late spring or early summer. In the interim, research, testing and educational activities will continue under the direction of Harvin R. Smith. The search committee, chaired by Dr. Don Ethridge of the Agricultural Economics Department at Texas Tech University, will aggressively pursue and solicit applicants who are capable of providing the leadership necessary to maintain current programs and to expand the scope and mission of the Center.

Presently the search committee is hard at work establishing criteria that will be used to screen applicants and to make the final determination. Should you have nominations, please make their names known to Dr.Don Ethridge or other members of the search committee who are: Mr. Roy Baker, South Plains Ginning Research Lab, USDA/ARS; Dr. Fred Bryant, Range and Wildlife Management Department, Texas Tech University; Mr. Edwin R. Foster, International Center for Textile Research and Development, Texas Tech University; Mr. Donald Johnson, Plains Cotton Growers; Mr. Van May, Plains Cotton Cooperative Association; Ms. Nancy Patton, Patton Cotton-Company; Dr. JoAnn Shroyer, College of Human Sciences, Texas Tech University, and Dr. Richard Tock, Chemical Engineering Department, Texas Tech University.

DR. JANE K. DEVER TO JOIN CENTER STAFF

Texas Tech University's International Center for Textile Research and Development is pleased to announce the addition of Dr. Jane K. Dever to the staff. Dr. Dever will be joining the Research Center in February 1993 as head of our materials evaluation laboratories.

Dr. Dever received her B.S. degree in Textile Technology in 1983; M.S. in Crop Science, 1986; and Ph.D. in Agronomy, 1989, all from Texas Tech University. Dever will be coming from the Texas A&M Agricultural Experiment Station at Lubbock, where she has been involved in all phases of the Cotton Improvement Program. She has been directly responsible for the fiber quality enhancement portion of the cotton program since 1985, and responsible for maintaining producer financial support for the Cotton Improvement Program and for cooperative research with the Textile Research Center and USDA/ARS. She has research experience in cotton fiber utilization in new spinning systems here at the Center and in cotton fiber development for new ginning and cleaning preparation sequences in cooperation with the TRC and the USDA/ARS Ginning Laboratory.

Dever will be a welcome addition to the staff with her research expertise and her knowledge in cotton and fiber testing.

VISITORS

Visitors to the International Center for Textile Research and Development during August and September included George E. Petrides, Petrisco International Corp., Dover, NJ; Nickolous Samaropoulos, Variety Research Institute of Cultivated Plants, Thessaloniki, Greece; Takazumi Ueno, Ueno & Co., Ltd., Osaka, Japan; Danie Oliver, Premier Food Industries, Marble Hall, South Africa; Mr. & Mrs. Stewart Leadbetter, Brookstead, Queensland, Australia; Fernando Guerra, Nylon de Mexico, Monterrey, Mexico; Ramon Alonso, Du Pont, Charlotte, NC; and Angela and Keith Fox, San Antonio, TX.

Several groups visited the Center during this time, including 22 participants in a Credit and Finance Workshop which was held in Lubbock; 30 USDA Extension Agents in Lubbock for their state meeting; and 49 students from Texas Tech University's College of Human Sciences.

During September the ICTRD conducted a special one-week course for representatives of the Cotton Research Institute, Agricultural Research Center, Giza, Egypt. Attending the school were Ahmed Abd El-Whab Hegab, Mahmoud Anwar Mahgoub, Mohamed El-Saghir Abdellah, Ahmed Effat M. Y. Ismail and Maher Talaat M. Ragab.

Also, Jack Cloude of the High Plains Research Foundation, Plainview, TX brought eight agricultural researchers from Sudan (Africa) to observe and discuss the work conducted at the Center.