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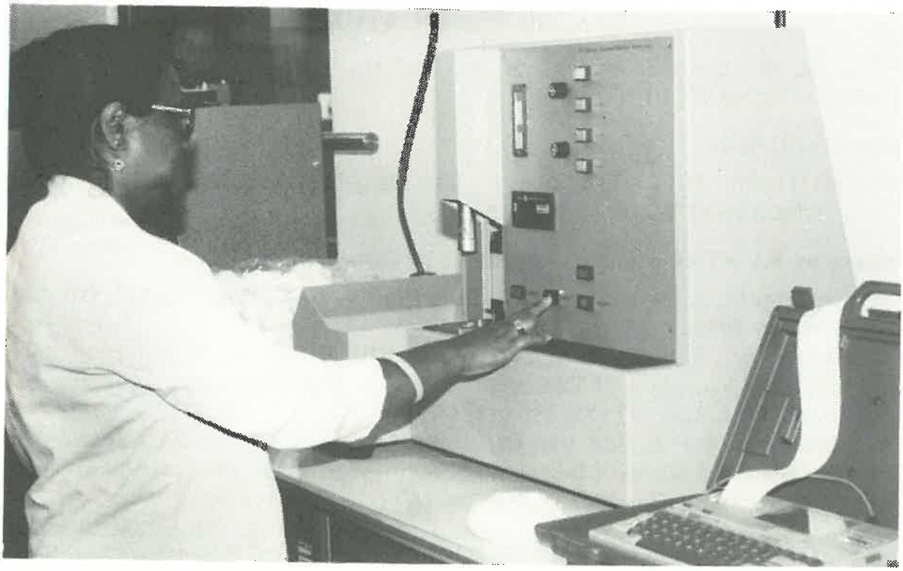

The IIC Shirley Fineness Maturity Tester recently acquired by SAWTRI.

Staff News

Mr S M Broderick, who holds a B.Sc.(Hons.) degree in Chemistry from the University of Port Elizabeth, was appointed as Assistant Researcher in the Scouring Department from the 1st of January 1987, and Mr G K Anderson has been appointed as Toolmaker in the Department of Innovation and Machine Development as from the 1st of February.

SAWTRI PUBLICATIONS

Since the previous edition of the Bulletin, the following papers were published by SAWTRI:

Technical Reports

No. 590 Trollip, N.G. and Raabe, F., The Use of Sulphur Dioxide Gas in the Setting of Wool. (February 1987).

Papers by SAWTRI Authors Appearing in Other Journals

Galuszynski, S., Measurement of Seam Pucker. J.S.N. International, No. 86, 26 (November 1986).

Hunter, L., Smuts, S. and Gee, E., The Effect of Medullation and Coefficient of Variation of Diameter on the Air-flow Measured Diameter of Mohair. J. Text. Inst. **77** (5), 336 (1986).

Maasdorp, A.P.B. and Van Rensburg, N.J.J., SEM and EDS Studies of Mordant Bleached Karakul Fibres. Proceedings: Electron Microscopy Society of Southern Africa, Potchefstroom. **16**, 167 (December 1986).

Barella, A., Manich, A.M., Castro, L. and Hunter, L., Una contribución al estudio del diámetro y la vellosidad de los hilos de mezcla poliéster-algodón de hilatura de anillos y de rotor. Investigacion e Informacion Textil y de Tensioactivos, Vol. XXIX (3), 89 (September 1986).

WOOLLEN SPUN WRAP YARNS

PART 2: THE EFFECT OF DRAFT AND ASSOCIATED CHANGES IN YARN LINEAR DENSITY ON SOME YARN AND FABRIC PROPERTIES

by

A G Brydon & J P van der Merwe

ABSTRACT

The effects of applying draft to a woollen slubbing during wrap spinning and the associated changes in yarn linear density, were investigated. Various levels of draft were used to produce both wrap spun yarns and ring spun yarns for comparison. In addition, an undrafted wrap yarn was produced. The undrafted wrap yarn was found to be more regular and gave higher values of extension than the drafted yarns but lower values of tenacity. Increasing the level of draft was found to increase tenacity, within the limits of draft investigated, whilst also increasing irregularity and decreasing yarn extension. Drafting had little or no effect on fabric specific volume, air permeability or area shrinkage.

INTRODUCTION

The woollen carding machine is the most important piece of equipment in the production of woollen spun yarns. The spinning machine plays the comparitively minor role of drafting and applying twist to convert the slubbings into yarn[1]. The development by SAWTRI of a method of wrap spinning directly on the woollen card[2, 3], eliminated the need for a twisting stage. However, no draft was applied to the slubbings. It is conceivable that drafting facilities may be desirable from an industrial point of view, the main reason being that the slubbing can be condensed to a heavier linear density, thus increasing the production rate of the card. It has been noted that this feature is particularly important to the fine woollen trade[4]. This report concentrates on the effect of drafting and the associated changes in yarn linear density, on some yarn and fabric properties and continues previous work on Woollen Spun Wrap Yarns[5].

EXPERIMENTAL

Raw Materials

A blend of wool fibres having a mean fibre diameter of 22,5 μm and a mean fibre length of 78,6 mm, was used to produce the various yarns.

Blending and Carding

Five percent of ®Duron SPS (Hansawerke) (o.m.f.) in an emulsion with 12% water was applied to the wool during blending. The blend was allowed to stand for at least 24 hours before being converted into 150 tex slubbings on a Tathams woollen carding machine.

Wrap Spinning

For reasons of convenience, a small wrap spinning frame was constructed[6] which allowed the slubbings to be drafted whilst being wrapped with filament (Fig. 1). The hollow spindles were mounted horizontally. Drafting was achieved by varying the speed of the delivery rollers in relation to that of the feed rollers. False twist was imparted to the slubbings during drafting by means of a false twisting device fitted to the delivery end of the hollow spindle and situated close to the nip of the delivery rollers. Thus, the spinning frame allowed wrap spinning directly on the woollen card, as previously described[1], to be effectively simulated but with the additional feature of drafting facilities.

Drafted woollen spun wrap yarns were produced using the following five levels of draft.

In addition an undrafted wrap yarn was produced. In each case a 44 dtex polyamide filament was used as a wrapper at a wrapping density of 200 wraps per metre.

1,17; 1,2; 1,27; 1,34; 1,4:

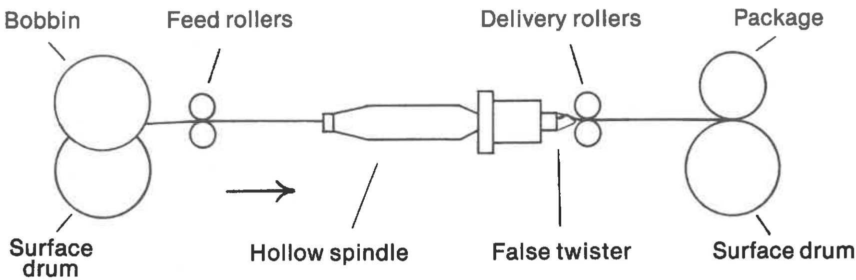

Fig. 1: Apparatus for drafting woollen slubbings.

Ring Spinning

For purposes of comparison, some of the slubbings were ring spun on a Platt MWR 4 woollen ring spinning frame using the same drafting levels as that used in the production of the wrap yarns. A tex twist factor of 23 was employed in each case.

Knitting

Plain single jersey fabric samples were knitted on an 8 gauge Dubied MF5 flat bed knitting machine from each individual yarn lot. The fabric pieces were knitted to a Machine Tightness Factor of 12.

Fabric Finishing

Knitted fabric samples were cut to approximately 1 metre lengths. The samples were folded in half, face to face and linked at the sides. The fabric samples were then milled in a Pegg side paddle machine for 20 minutes at 40°C in a bath containing 1g/1® Ultravon HD (Ciba-Geigy). Upon completion of the milling cycle, the fabrics were rinsed at 40°C for 5 minutes followed by a final rinse for 5 minutes at room temperature. The fabrics were subsequently hydro-extracted and tumble dried for 20 min.

Yarn and Fabric Testing

Various yarn and fabric properties were measured, employing standard test methods.

RESULTS AND DISCUSSION

Effect on Yarn Properties

In the following discussion, when referring to draft, it should be noted that there is an associated change in linear density. The results of the various tests carried out on the yarns are given in Tables 1 and 2. Wrap yarn tenacity increased as the level of draft increased whilst extension decreased. Irregularity increased as the level of draft became higher. Although no consistent trends were noted in regard to the number of thick places or the number of neps in the wrap yarns, the number of thin places increased as the level of draft increased. In comparison to the drafted wrap yarns, the undrafted wrap yarn was more regular and gave higher values of extension, though the tenacity was lower. The results obtained for the ring yarns were similar in character to that of the wrap yarns. Although the drafted wrap yarns were more irregular than the drafted ring yarns, the former yarns were more tenacious.

Effect on Fabric Properties

The results of the various tests carried out on the fabric samples after finishing are given in Table 3. It was initially thought that drafting would reduce the bulkiness of the resulting fabrics. This was not found to be the case. The values obtained for the specific volume of the fabric samples indicated that drafting had little effect on fabric bulkiness. Similarly, drafting did not appear to significantly affect air permeability, although it was noted that in agreement with earlier work[5,7], the fabrics knitted from wrap yarns were less permeable to air than the fabrics knitted from ring yarns, thus confirming that

TABLE 1
PHYSICAL PROPERTIES OF THE WRAP YARNS

Draft		0	1,17	1,2	1,27	1,34	1,4
Linear density of core (tex)		150	128	125	118	112	107
Tenacity (cN/tex)		3,9	4,9	5,1	5,1	5,3	5,3
Extension (%)		24,2	19,4	18,5	18,9	16,6	16,0
Irregularity (Cv%)		11,8	11,9	12,9	13,3	13,6	13,9
Thin places	Per 1 000 m	4	1	13	9	20	61
Thick places		5	0	4	12	8	5
Neps		1	0	1	1	8	3

TABLE 2
PHYSICAL PROPERTIES OF THE RING YARNS

Draft		1,17	1,2	1,27	1,34	1,4
Linear density of core (tex)		128	125	118	112	107
Tenacity (cN/tex)		3,9	4,3	4,3	4,4	4,5
Extension (%)		20,0	17,9	17,8	16,7	14,8
Irregularity (Cv%)		11,7	11,3	11,7	12,6	12,7
Thin places	Per 1 000 m	2	0	3	7	14
Thick places		0	0	1	4	3
Neps		4	0	3	3	9

woollen spun wrap yarns obtain a higher degree of cover in knitted form than woollen spun ring yarns.

Although no consistent trends were found relating to the shrinkage of either the drafted wrap yarns or the ring yarns during milling, it was noted that the fabric knitted from the undrafted wrap yarn shrank less than any of the fabrics knitted from drafted yarns.

TABLE 3
SOME PROPERTIES OF THE PLAIN KNITTED FABRICS

	RING					WRAP					
Draft	1,17	1,2	1,27	1,34	1,4	0	1,17	1,2	1,27	1,34	1,4
Area shrinkage (%)	24,1	21,2	21,8	21,3	22,6	19,8	22,4	23,4	22,8	22,2	24,1
Specific volume (cm^3/g)	8,83	8,06	8,19	8,45	8,44	8,03	7,91	7,80	8,09	8,08	7,90
Air permeability ($ml/cm^2/98$ pa)	63,5	59,5	60,3	63,9	66,3	52,7	53,0	56,0	56,3	56,3	53,1

ACKNOWLEDGEMENTS

The authors thank the staff of the departments of Textile Physics and Knitting at SAWTRI for technical assistance.

USE OF PROPRIETARY NAMES

The names of proprietary products where they appear in this report are mentioned for information only. This does not imply that SAWTRI recommends them to the exclusion of other similar products.

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