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Inter-Port Differences in Processing Performance of Similar Wools

Part II: The Processing Performance of a 10/12 Months 60/64's During Topmaking

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INTER-PORT DIFFERENCES IN PROCESSING PERFORMANCE OF SIMILAR WOOLS
PART II: THE PROCESSING PERFORMANCE OF A 10/12 MONTHS 60/64's DURING TOPMAKING

by D.W.F. TURPIE

ABSTRACT

A comparison in the processing performance during topmaking of wools from the ports of Durban, Port Elizabeth and Cape Town was carried out on a 10/12 months 60/64's good topmaking wool, known as type 54. The lots were all relatively well matched, and it was found that, generally, differences in performance were relatively small. These differences may have been related either to slight differences in staple crimp, compressibility or weathering of the raw wool.

INTRODUCTION

A series of investigations has been initiated in which a study is being made of any differences in processing performance during topmaking of similar specific types from the various South African ports. The first such investigation[1] dealt with a comparison in the processing performance of a 12 months 60/64's Good Topmaking wool, known as *type 49*, from Durban, Port Elizabeth and Cape Town. Sample bales were made up from the December, January and February offerings of T49 from each of these ports separately to provide for replicate experiments.

It was found that the Cape Town lots were inclined to be rather overcrimped compared with the lots from Durban and Port Elizabeth and were also inclined to have the highest staple lengths. This overcrimping led to a significantly poorer processing performance in respect of the Cape Town wools (even in spite of their greater length), both with regard to percentage noil and the length characteristics of the top. In respect of the other physical characteristics of the grease wools it appeared that the wools were fairly well matched.

Subsequent to publishing the abovementioned report a spinning trail was carried out on the tops, but this was restricted to 19 tex yarns only[2]. From the results obtained it could be seen that there was little difference between the spinning potential of the wools from the different ports. Nevertheless the potential followed a trend which was inversely correlated with the raw wool staple crimp, the Cape Town wools giving the poorest performance. The magnitude of the difference observed was in line with the value of 200 - 300 rev/min per unit change in crimp frequency reported elsewhere[2].

One of the most interesting findings of this study was the apparent rôle played by crimp. It would seem that had these wools been matched in crimp

there would have been no difference in processing performance between the offerings of type 49 from Cape Town, Port Elizabeth or Durban.

As a result of the above investigation it was decided to extend the study to a comparison in the processing performance of a slightly shorter type, namely a 10/12 months 60/64's good topmaking wool, known as *type 54*, from the same three ports

EXPERIMENTAL

The experimental design pertaining to the first investigation in this series was duplicated, sample bales being made up from the December, January and February offerings from each of the three ports separately to provide for replicate experiments. Machine settings were all the same as before. Staple tip entanglement was measured by a method adopted in a recent investigation, using a SAWTRI withdrawal force tester.[4]

RESULTS AND DISCUSSION

Grease wool

The grease wool characteristics of the T54 from the different ports are given in Table I. In general it appeared that the wools were well matched in their physical properties, but with a few minor exceptions. For example the Port Elizabeth lots were slightly more undercrimped, and the Durban lots slightly more overcrimped than the Cape Town lots. The Cape Town lots were also slightly longer in the staple than the lots from the other two ports, and appeared to be less entangled in the tip. The Durban lots had a slightly lower staple length than the lots from the other two ports.

Scouring

The scouring results are given in Table II. Similar grease levels were obtained on all lots, but this required somewhat higher detergent additions in the case of the Cape Town lots than in the case of the lots from the other two ports. The amount of bowl waste was about the same in each case. The compressibility results showed that the Cape Town wools were marginally more resistant to compression than the others.

Carding and gilling results

The carding results given in Table II show that similar amounts of waste were rejected during carding, and resultant card yields were similar in all cases. With regard to the cleanliness of the slivers the Durban lots appeared to be marginally more neppy and to be contaminated with slightly less vegetable particles than the lots from both the other ports. The results after gilling supported these observations.

TABLE I

GREASE WOOL CHARACTERISTICS OF TYPE 54

	DURBAN				PORT ELIZABETH				CAPE TOWN			
	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean
Mean fibre diameter (μm)	22,3	22,5	22,5	22,4	22,5	22,2	22,4	22,4	22,2	22,3	22,2	22,2
IWTO scoured yield (17% regain)	65,1	66,6	65,1	65,6	68,4	68,2	69,1	68,6	69,4	69,5	69,7	69,5
IWTO estimated commercial drycombed yield (%)	62,2	63,9	62,5	62,9	65,7	65,5	66,2	65,8	66,2	66,0	66,5	66,2
VM dry, grease basis	0,49	0,42	0,33	0,41	0,43	0,39	0,51	0,44	0,68	0,87	0,73	0,76
Staple length, Unstretched (mm)	79,3	81,4	83,2	81,3	78,3	79,8	81,7	79,9	82,6	82,6	83,6	82,9
CV (%)	12,0	13,9	13,1	13,0	15,4	15,0	12,6	14,3	12,7	14,7	16,6	14,7
Staple length, stretched (mm)	85,4	88,0	89,5	87,6	84,3	86,3	88,9	86,5	88,8	88,8	90,2	89,3
CV (%)	12,2	13,6	13,0	12,9	15,5	15,4	12,8	14,6	13,2	14,5	14,4	14,0
Crimp frequency (no. per cm)	4,0	3,8	3,8	3,9	3,6	3,7	3,7	3,7	3,8	3,7	3,8	3,8
Deviation from Duerden (%)	+4	+1	+1	+2	-5	-5	-3	-4	-2	-4	-2	-3
Grease content (%)	13,3	11,0	14,2	12,8	14,6	15,9	14,1	14,9	16,1	16,7	17,2	16,7
Methanol insoluble fraction (%)	50,0	51,8	48,8	50,2	52,9	52,2	56,0	53,7	54,5	55,5	51,9	54,0
Suint content (%)	7,5	7,2	7,1	7,3	7,7	8,3	9,0	8,3	6,3	6,3	6,3	6,3
pH of suint	6,3	6,5	6,1	6,3	6,4	6,3	6,3	6,3	6,1	6,2	6,0	6,1
Staple strength (cN/tex)	2,8	2,7	2,6	2,7	2,8	3,0	2,8	2,9	2,9	3,2	3,2	3,0
Staple tip entanglement (N/g)	119	115	139	124	134	98	141	124	89	88	84	87

TABLE II

SCOURING, CARDING AND GILLING RESULTS

	DURBAN				PORT ELIZABETH				CAPE TOWN			
	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean
Scouring results												
Av. detergent addition (mℓ)	54	0	54	36	52	52	78	61	130	130	130	130
Grease content of scoured (%)	0,44	0,51	0,37	0,44	0,46	0,42	0,39	0,42	0,37	0,43	0,41	0,40
pH of liquor in bowl 1 at end	9,7	10,0	9,9	9,9	9,9	9,8	10,1	9,9	10,2	10,1	10,2	10,2
Bowl waste (% on greasy)	0,7	0,7	0,5	0,6	0,6	0,6	0,7	0,6	0,6	0,5	0,7	0,6
Scoured yield at 16% regain (%)	62,7	65,5	64,0	64,1	67,1	66,2	67,5	67,0	68,1	68,7	69,0	68,6
Compressibility of scoured (mm)	18,8	17,6	17,3	17,9	17,1	18,8	17,2	17,7	17,7	19,4	18,0	18,4
Carding results												
Card rejects (% on greasy))	1,9	2,1	2,0	2,0	2,1	2,1	2,3	2,2	2,3	2,5	2,5	2,4
Card yield (%)	97,3	97,2	97,2	97,2	97,3	97,3	97,0	97,2	96,9	96,7	96,7	96,8
Neps after carding per 20 g	45	44	69	53	33	27	48	36	25	37	44	35
Veg. after carding per 20 g	208	162	147	172	224	260	289	258	232	259	268	253
Gilling results												
Neps before combing per 20 g	70	66	89	75	41	70	40	50	28	51	25	35
Veg. before combing per 20 g	187	178	160	175	185	211	239	212	215	232	221	223
Regain before combing (%)	18,7	20,6	19,8	19,7	18,7	18,3	20,7	19,2	19,0	19,3	17,7	18,7
Dichloromethane extractable matter (%)	0,59	0,72	0,78	0,70	0,70	0,71	0,65	0,69	0,61	0,65	0,61	0,62

TABLE III

COMBING RESULTS AND TOP CHARACTERISTICS

	DURBAN				PORT ELIZABETH				CAPE TOWN			
	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean	Dec	Jan	Feb	Mean
Combing results												
Percentage noil	3,83	3,95	4,30	4,03	3,47	3,43	3,92	3,61	4,32	4,31	4,35	4,33
Equivalent combing tear				23,8				26,7				22,1
Comb shoddy (% on greasy)	0,7	0,4	0,4	0,5	0,7	0,7	0,5	0,6	0,8	0,7	0,7	0,7
Comb yield (%)	101,2	101,4	101,5	101,4	101,1	101,0	101,4	101,2	101,0	101,2	101,1	101,1
Drycombed top and noil yield (%)	61,7	64,6	63,1	63,1	66,0	65,1	66,4	65,8	66,6	67,2	67,5	67,1
Characteristics of top												
Mean fibre length (mm)	74,1	71,5	69,2	71,6	73,7	75,2	73,9	74,3	70,3	71,1	70,6	70,7
CV (%)	40,4	47,2	47,7	45,1	41,6	42,9	41,6	42,0	48,7	48,9	49,7	49,1
Fibres shorter than 25 mm (%)	2,4	5,2	5,8	4,5	2,7	3,4	2,8	3,0	6,6	6,6	7,6	6,9
5% length or 'tail' length (mm)	115,3	120,6	117,6	117,8	115,8	118,8	116,5	117,0	118,7	119,2	121,1	119,7
Mean fibre diameter (μm)	22,2	22,3	22,2	22,2	22,3	21,8	22,2	22,1	22,1	22,0	22,0	22,0
Dichloromethane extractable matter (%)	0,59	0,67	0,78	0,68	0,68	0,76	0,51	0,65	0,61	0,65	0,66	0,64
Neps per 20 g	5	2	4	4	3	7	4	5	3	4	4	4
Veg. particles per 20 g	11	11	10	11	14	10	15	13	11	12	9	11
Compressibility of steamed top (mm)	15,0	14,5	14,8	14,7	14,2	14,3	14,4	14,3	15,2	15,0	15,0	15,1
Conversion ratio (raw wool staple length to top)	1,07	1,14	1,20	1,14	1,06	1,06	1,11	1,08	1,17	1,16	1,18	1,17
Tail length: mean length ratio	1,56	1,69	1,70	1,65	1,57	1,58	1,58	1,57	1,69	1,68	1,72	1,69

Combing

The combing results are given in Table III. The amount of comb shoddy was similar for all lots, as also the comb yield. The drycombed top and noil yields were generally in very good agreement with the yields predicted by the core tests although two of the Cape Town lots gave overyields of about 1%. Percentage noil results were all fairly close, the results for the Port Elizabeth lots being the lowest and the results for the Cape Town lots being the highest.

Top characteristics

The mean fibre length of the tops should be compared with the staple length of the raw wool. It can be seen that while the Port Elizabeth lots had shorter staple lengths than the lots from the other two ports, they produced the longest tops and the lowest short fibre content. The Cape Town lots had the highest staple lengths, yet they produced the shortest tops and the highest short fibre content. The conversion ratio was, therefore, lowest for the Port Elizabeth lots and highest for the Cape Town lots. The tail length of the Cape Town lots was slightly better than the others and these lots also had a marginally better tail length: mean length ratio. All tops were of equal cleanliness both with regard to neps and vegetable particles, and the mean fibre diameter results show that all the lots were practically the same fineness, this being about 0,2 μm less than the mean fibre diameter measured in the raw state.

It is possible that staple crimp may have played a rôle in the performance of the Port Elizabeth lots. These were relatively speaking, slightly more undercrimped, they produced scoured wools and tops with the lowest resistance to compression, the highest combing tears and the best length characteristics in the top. It is also possible, however, that compressibility and possible slight differences in weathering may have played a rôle in the relative performance of the wools from the other two ports.

SUMMARY AND CONCLUSIONS

This report is the second in a series of investigations in which a study was made of any differences in processing performance during topmaking of similar specific types from the various South African ports. The specific type of this instance was type 54, which is a 10/12 months 60/64's good topmaking wool. Samples bales were made up from the December, January and February offerings of type 54 from Durban, Port Elizabeth and Cape Town to provide for replicate experiments.

The lots were all relatively well matched, and it was found that differences in performance were relatively small. These differences may have been related either to slight differences in staple crimp, compressibility or weathering of the raw wool. The Port Elizabeth lots, which had the lowest resistance to

compression and were relatively the most undercrimped, gave a performance which was slightly better than that of the lots from the other two ports. Had these physical characteristics been more precisely matched, it would seem that there would have been no difference in processing performance.

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