

KNITTING OF DEVELOPMENT FABRICS FOR THE FRED PERRY (UK) PROJECT

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1. INTRODUCTION

This project resulted from a request from Fred Perry Sportswear (UK) Limited requesting IIC to assist in developing a fabric with improved shrinkage performance on their recognised Fred Perry Lacoste structure.

The presents structure consists of an 18 gauge fabric knitted from 1/16's Ne combed yarn with a stitch length of 0.393 cms.

Currently, fabric shrinkages of approximately 12-14% in length and 10-12% in width are being recorded. A prime requirement of this study is to obtain the improvement in performance but not to increase the fabric weight and therefore to meet this requirement it is necessary to re-engineer the fabric.

2. PLAN OUTLINE

In order to reduce shrinkages whilst maintaining the desired weight it is necessary to change both yarns and knitted stitch lengths. Three counts of yarn were therefore selected:

1/16's, 1/18's, 1/20's cc - all supplied by Gugelmann of Switzerland.

The Fred Perry Lacoste structure is as follows:

1. xxxxxx - feeder 1, all knit
2. .x.x.x - feeder 2, tuck/knit
3. xxxxxx - feeder 3, all knit
4. x.x.x. - feeder 4, knit/tuck

The amount of yarn going into each course was kept constant, i.e. a 1:1 ratio, in order to minimise the number of variables in the exercise.

2.1 The knitting plan consists of the 3 yarn counts over 5 stitch lengths.

	<u>STITCH LENGTH/CMS</u>				
1/16 Ne	0.323	0.339	0.355	0.370	0.388
1/18 Ne	0.323	0.339	0.355	0.370	0.388
1/20 Ne	0.306	0.323	0.339	0.355	0.370

The division between stitch length is approximately 5%.

3. KNITTING DETAILS

The actual knitting of these fabrics took place at the firm of Kingsly Knight Limited in Leicester between 10-15th April 1989. Only one machine was used for this exercise, a Monarch 18 gauge, Model RX-3S, 26"

diameter with 1500 needles. The machine had 78 feeders but for this construction only 76 were in use. A machine speed of 30 rpm was maintained throughout the exercise.

The yarn feed was through two trip tapes with two adjoining feeders on each tape, i.e. feed 1 and 2 = tape 1, feed 3 and 4 = tape 2, etc.

3.1 Yarn Measurements During Knitting

Measurement of the actual amount of yarn going into the fabric was made using a Welmstar run-in meter, Model RS 100, and all the yarns were set to 5 grams tension throughout the exercise.

3.2 Comments on the Knitting

The knitting was completed exactly as described in the knitting plan and the tightest stitch length achieved with each yarn was considered to be close to the tightest commercial possible with this particular construction on this particular knitting machine.

Warning: The stitch length of 0.306 on the 1/20 Ne could only be achieved with good combed yarn on a well maintained knitting machine. The yarns used in this exercise were very even and gave no trouble at all during the whole of the exercise and a very low fault rate resulted. Each piece was made to an approximate length of 50 metres. This metreage is necessary as the finishing techniques have yet to be established and adjustments have to be made during final processing. The total weight of greige fabric produced was 265.15 kilograms.

3.3 Piece Code: Each piece is marked with the machine gauge, the yarn count, and the stitch length in cms. i.e. 18/1-16/323. Decode: 18 gauge machine, 1/16 Ne yarn, stitch length 0.323 cms. (See production sheet [Table 1]).

4. TESTING

4.1 Yarns

The yarn test results are shown in Figure 1 and indicate that the yarn counts were quite close to the nominal stipulated counts. Single end strengths indicate a good staple length and the coefficient of friction suggests quite good waxing. The overall consensus from these results would be that all the yarns were of a high standard.

4.2 Greige Fabric Testing

The test results are shown in Figure 2 and show that the stitch lengths as measured on the knitting machine were very close to those obtained in our laboratory using the Shirley Crimp Tester.

These results have been plotted and show a good correlation between the two methods of measuring (Figure 3).

The courses given are the actual courses and not visible courses.

Date: 10-15 April 1989

MACHINE SPEED 30 rpm
 MACHINE GAUGE 18
 MONARCH RX-3S

Needles = 1500
 Diameter = 26"
 78 Feeders
 76 In use

TABLE 1

PRODUCTION SHEET

FRED PERRY LACOSTE

Piece No.	T.F.	Courses off m/c per 3cms	Revs produced	Piece weight in kilos	Measured course length in cms	Remarks
18/1-16/323	18.80	69	1513	20.9	485	Width on m/c 89 cms
18/1-16/339	17.92	60	1315	18.85	509	88
18/1-16/355	17.11	58	1271	19.50	532	87
18/1-16/370	16.42	56	1227	19.65	556	86
18/1-16/388	15.66	52	1140	18.55	582	86
18/1-18/323	17.73	67	1469	18.20	485	88
18/1-18/339	16.90	60	1315	17.10	509	88
18/1-18/355	16.13	58	1271	17.30	532	87
18/1-18/370	15.48	56	1227	17.50	556	86
18/1-18/388	14.76	52	1140	17.00	582	86
18/1-20/306	17.76	76	1666	17.50	459	87
18/1-20/323	16.82	68	1491	16.60	465	86
18/1-20/339	16.03	60	1315	15.40	509	85
18/1-20/355	15.30	58	1271	15.50	532	85
18/1-20/370	14.69	56	1227	15.60	556	85

General Comments.

1. yarns from Gugelmann, Switzerland (combed)
2. each piece approximately 50 metres long
3. no cutting line in fabric
4. 5g tension on yarn during knitting

$$TF = \sqrt{\frac{\text{TEX}}{\text{Stitch length cms}}}$$

FRED PERRY

GUGELMAN YARN

SAMPLE NO.	16 ^s	18 ^s	20 ^s
Yarn count (Tex)	37.21	32.95	29.94
Twist (turns per metre)	588	657	699
Single end strength (g)	598.92	521.82	466.39
Extension at break (%)	6.88	6.66	6.58
Coefficient of friction (μ)	0.16	0.16	0.15
Yarn count (Ne)	15.87	17.92	19.73
Turns per inch	14.94	16.69	17.74
Twist Factor - alpha Tex	35.87	37.71	38.22
Twist Factor - English	3.75	3.94	3.99
Tenacity (g./Tex)	16.10	15.84	15.58

Table

Fred Perry - Greige Fabrics

GREY

	16/323	16/339	16/355	16/370	16/386	16/323	16/339	16/355	16/370	16/386
Length shrinkage (%), 5x	16.65	18.29	20.87	23.67	25.31	17.45	20.55	23.03	25.01	26.51
Width shrinkage (%), 5x	19.86	18.61	16.49	15.12	13.20	20.08	19.89	18.06	16.17	13.29
Weight (gsm), AW	340.25	329.17	322.91	313.48	300.35	306.55	301.05	288.38	280.51	269.24
Courses per 3cm, BW	74.60	69.70	63.60	59.40	56.10	73.50	67.40	62.10	58.20	53.00
Courses per 3cm, AW	90.00	84.60	81.20	78.00	74.80	90.50	86.00	81.70	78.00	74.00
Wales per 3cm, BW	23.65	23.30	23.00	22.80	22.70	23.80	23.25	23.10	22.90	22.95
Wales per 3cm, AW	29.40	28.25	27.80	26.80	25.85	29.65	29.20	28.85	26.90	26.35
Stitch length (mm) BW	3.24	3.41	3.56	3.71	3.89	3.24	3.39	3.54	3.72	3.87
Stitch length (mm) AW	3.18	3.34	3.49	3.64	3.79	3.20	3.35	3.51	3.66	3.81
Angle of spirality, BW	5.29	6.35	7.04	7.98	9.04	7.40	8.65	9.83	10.46	9.99
Angle of spirality, AW	4.79	5.11	5.21	5.76	6.60	5.66	5.93	7.20	7.72	8.25

NOTES

5x after 5 machine wash (60 deg.C.)/tumble dry cycles

BW as received (before wash)

AW after 5 wash/tumble dry cycles (after wash)

Table

Fred Perry - Greige Fabrics

GREY

	20/386	20/323	20/339	20/355	20/370
Length shrinkage (%), 5x	16.87	20.95	22.16	23.98	26.28
Width shrinkage (%), 5x	23.52	21.53	20.39	18.80	17.40
Weight (gsm), AW	291.73	280.14	272.01	265.69	256.77
Courses per 3cm, BW	60.00	71.20	66.20	62.00	56.90
Courses per 3cm, AW	95.70	90.80	86.10	82.10	79.10
Wales per 3cm, BW	23.90	23.85	23.15	23.50	22.55
Wales per 3cm, AW	30.95	30.15	28.90	28.50	27.55
Stitch length (mm) BW	3.87	3.23	3.38	3.56	3.71
Stitch length (mm) AW	3.81	3.17	3.31	3.48	3.63
Angle of spirality, BW	5.89	7.05	7.33	10.00	10.25
Angle of spirality, AW	6.43	6.84	7.34	8.45	9.51

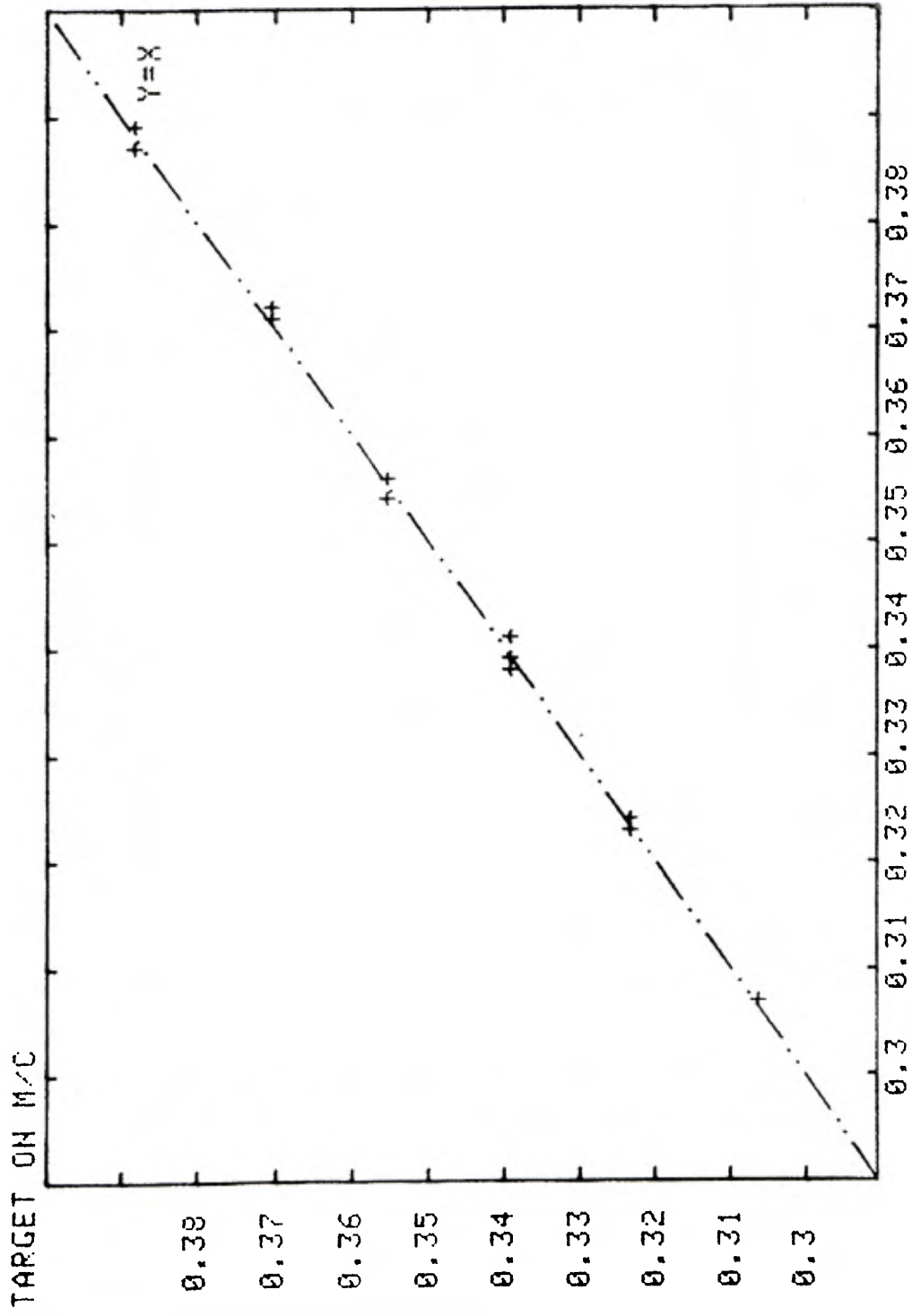
NOTES

5x after 5 machine wash (60 deg.C.)/tumble dry cycles

BW as received (before wash)

AW after 5 wash/tumble dry cycles (after wash)

STITCH LENGTHS AS SET ON MACHINE AND MEAS. IN LAB AT I.I.C



MEASURED IN LABORATORY