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28 Gauge Interlock
Production And Grey Fabric Analysis

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Contents

1. Introduction

TRD's long term programme of applied research into the performance and properties of 100% cotton knitgoods has, to date, included studies of both double and single jersey structures processed through a variety of different finishing routes.

In the single jersey programme plain knit fabrics produced from both singles and two-fold yarn on three different gauges of knitting machine have already been evaluated. However, in the double jersey programme we have so far relied entirely on two machines; 14 gauge rib and 20 gauge interlock. Although from these data we have been able to construct potentially useful computer models which enable predictions regarding finished fabric dimensions to be calculated, obviously we need to examine at least one other gauge of machine per structure, to confirm that there is no independent influence of machine gauge on fabric dimensions and also to secure the slopes and coefficients of the equations.

With this in mind, therefore, it was decided to carry out trials on 28 gauge interlock as the next step in extending the double jersey data base. This report covers the fabric production details and the preliminary analysis of the grey fabric test results from these trials.

Part 1: Fabric Production

1.1. Introduction

Towards the end of 1980 the decision was taken to extend the double jersey studies to include 28 gauge interlock fabrics. From previous experience it had been agreed that a minimum of 15 qualities (3 yarn counts *x* 5 stitch lengths) was necessary to provide a sufficiently comprehensive data base on which to develop the regression equations and, ideally, sufficient fabric for processing through at least two different finishing routes would be required. Based on a minimum requirement of approximately 50 metres per piece for finishing, calculations regarding the amount of yarn which would be required were made and Courtaulds Northern Spinning Division were contacted to supply the yarn. The yarn was delivered early in 1981 and was submitted to the laboratory for preliminary testing before knitting.

During 1981 there was neither time nor money available to proceed further with the project, although some preliminary enquiries were made within the trade to find a company who would be willing to provide knitting facilities for carrying out the project. In early 1982 the decision was finally taken to proceed with the knitting and enquiries were again made to find a suitable co-operator. Initially Corah had expressed a willingness to participate in this project but after repeated attempts to formally arrange co-operation, without success, it was eventually decided to take up the offer made by Courtaulds Research Group, Spondon, to use their knitting facilities. Arrangements were therefore made with Mr. Brian Rushall, who at that time was in charge of the knitting development unit, for IIC personnel to carry out the knitting over a period of some five weeks during June and July 1982. The charge for the hire of the knitting machine etc. was agreed at £40 for setting up plus £1.25 per kg of fabric produced.

1.2. Machinery and Instrumentation

The characteristics of the knitting machine located at Spondon were as follows.

- 28 gauge Kirkland DJK 48K, 2640 x 2 Needles
- 30" Diameter, 48 Feeders (46 in use)

- Running at 15 rpm and equipped with Trip Tape positive feed
- Setting on Interlock gating with a 3-needle delay.

Prior to starting the trials the Kirkland machine was equipped with a magnetic block and sensor to enable course length measurements to be made, with our Welmstar Type RS100 electronic course length counter to keep quality control monitoring compatible with previous trials.

Yarn run-in tensions were adjusted and monitored using our Schmidt Type 2 tension meter.

1.3. Knitting Plan

Following our standard 15-quality block system of 3 yarn counts *x* 5 stitch lengths the knitting plan was arranged as shown in *Table 1*.

A common commercial specification, i.e. Ne 1/60 at a stitch length of 0.248 cm (M&S specification for dresswear) was taken as a starting point but, as this was already towards the tight end of the knitting range, the stitch lengths were incremented in 5% divisions, one tighter and three slacker than the standard quality. The yarn counts chosen were incremented by 10 English counts to cover as wide a range of tightness factors as possible.

The order of knitting was carried out as shown in *Table 2*, changing yarns in preference to quality where possible.

1.4. Yarn

The yarn was ordered from Courtaulds Northern Spinning Division:

Ne 1-50 combed quality TX, Z twist

Ne 1-60 combed quality TX, Z twist

Ne 1-70 combed quality TX, Z twist

Delivered waxed on cones with a twist factor of 3.6.

After the yarn had been delivered, samples were submitted to the laboratory for preliminary testing, e.g. count, twist, friction against steel, single end strength, extension at break and twist liveliness, before knitting.

Preliminary Yarn Testing

Table 3 gives the results of the preliminary yarn testing. The results indicated that all the yarn as delivered was not as close to specification as we would have liked in terms of yarn count and twist factor - the Ne 1/60 was 4% out on count and the Ne 1/50 and 1/60 were 8% and 6% out on twist factor respectively. Because of the relatively small quantities of yarn involved we were not convinced that the situation would have been significantly improved by requesting replacement. Therefore the decision was taken to continue the exercise accepting the yarn as delivered.

Friction against steel, strength, and extension were within acceptable tolerances.

The results for twist liveliness cannot be commented on at this stage as the test method is still under development.

Yarn Faults

It was not practical to keep a comprehensive record of yarn faults during this trial, primarily because it was not always possible to properly distinguish specifically between yarn-related faults and those which were caused by the general condition of the knitting machine. However, the overall impression was that the Ne 1-50's seemed to cause more problems than the other two counts.

General Yarn Performance & quality

The general performance/quality of the yarn was adequate, although it would probably be unfair to be too critical as it is not really possible to say how much the general condition of the knitting machine contributed to the knitting problems which were encountered. A general comment can however be made regarding fly which did seem to be slightly excessive. The consequence was the need for frequent stops for the purpose of cleaning down the machine to avoid an excessive fabric fault rate, which would have resulted due to loose fly blocking feeder holes etc.

1.5. Fabric Production

The original plan allowed for 105 metres of each quality to be produced in two pieces. Piece No. 1 was to be 55 metres long, allowing 5 metres for grey testing, and Piece No. 2 was to be 50 metres long, and the yarn was ordered against estimates for fabric weight for each quality. After the first piece had been completed and weighed however, the calculations were rechecked and due to a slight underestimate in the original calculations, particularly for the Ne 1-50's, it was found necessary to reduce the total yardage per quality by 10 metres to ensure that there would be sufficient yarn available to complete the trial. Consequently, the full pieces available for further processing are all approximately 45 metres long.

For the same reason, i.e. the need to conserve as much as possible wastage on the Ne 1-50's, the order of knitting the final six pieces was reversed. Instead of changing quality from 0.273 to 0.287 on Ne 1-50's, the Ne 1-70's was put up before the quality was changed.

Both these remedial steps allowed the full programme to be completed. although with very little yarn left over.

Production Data & Quality Control

All quality control and production measurements recorded during the course of the knitting are listed on the production data charts given in *Table 4*.

Course Length

The course length target figure for each piece was calculated from the nominal stitch length multiplied by the number of needles in the machine cylinder. The course length figures quoted for the beginning and end of each piece are mean results of several readings taken over at least five feeders, selected at random around the machine.

On this particular machine the variation in run-in between individual feeders was quite marked, probably in the order of at least ± 1%. Therefore, although the mean readings did not vary very much from target (*Figure 1*), with the exception of piece one, the overall variability in stitch length may be somewhat higher than we have experienced in previous trials.

Courses /3cm off Machine

This measurement was intended only as a quick ready reckoner to enable the number of machine revolutions necessary to produce the required length of fabric to be calculated.

After each quality/yarn change a piece of fabric was taken from the machine and allowed to relax free of tension for several minutes. Courses /3cm were then measured, converted to C/cm, and the figure used to calculate machine revolutions.

$$Revs = 2 \times C/cm \times 100 \times 50 / No.\ of\ Feeders$$

NB: Two feeders are required to produce 1 visible course of interlock fabric.

Courses /3cm

As an additional production/quality control measurement the courses /3cm are usually measured at the beginning and end of each piece, centrally above the take-down rollers.

In this instance however it was not practically possible to make this measurement primarily due to the design of the machine. Therefore it was omitted.

Yarn Tension

Normally at the beginning of each piece the yarn input tension is checked, adjusted where necessary, and maintained throughout the production at between 3-5g.

On this particular machine the yarn input tension was particularly sensitive to temperature. For example, first thing in the morning when the machine was cold the tension could rise to 10g+ and had to be adjusted back to between 3-5g and then readjusted as the machine warmed up. Consequently, run-in tensions were checked at least every hour during production to ensure that they were maintained as consistently as possible.

Piece Identification

Each piece was marked at the beginning and end with a piece identification code.

e.g.	Code:	I28/1-60/248/1
	Decode:	Interlock, 28 gauge/ Ne 1-60/ Stitch length 2.48 mm/ Piece No. 1.

In addition to the code which is written on each piece, each piece also has a pink piece ticket attached to it. On these are written the location of the trials, i.e. Spondon, the piece identification code, the weight of the piece and any knitting comments, for example any faults in the fabric which need to be noted by the finishers.

Fabric Faults

Any holes created in the fabric during knitting were mended to avoid processing problems during finishing and noted on the piece tickets.

General Comments

Certainly some of the knitting problems encountered during our stay at Spondon were due in part to the general condition of the knitting machine which was perhaps not as well maintained as it could have been. For example, quite a lot of re-needling was required at the start of the trials, to try and improve the overall appearance of the fabric and to remove the more obvious needle lines.

On some qualities there was a problem with cutting, although this was normally resolved by adjusting the take-down tension. Also, on the slacker qualities there was a problem with drop stitches, especially along the stretcher board edges. Again most of the problem could be corrected by adjustments to the take-down tension but the knitting technician who was assigned to assist us mentioned that drop stitches were a known problem on this machine especially on slack qualities.

Overall, however, there were no serious mechanical problems with the machine and the fabrics were produced satisfactorily.

After the trials were completed, the Welmstar sensor and block were removed from the machine and brought back to TRD along with the residue of the yarn and all the fabric. The grey fabric test pieces were then submitted to the laboratory for evaluation.

Details of the weight of yarn knitted were given to Mr. Brian Rushall for invoicing.

1.6. Acknowledgements

We would like to record our appreciation to Mr. Brian Rushall for allowing us to use the facilities of the Spondon Research Group for these trials, and to Mr. Lou Glenn, the knitting technician assigned to assist us, for his time and co-operation.

Part 2: Grey Fabric Test Results And Preliminary Analysis

2.1. Introduction

Although previous experience has taught us that grey-relaxed dimensions are not necessarily a reliable indicator of a fabric's finished dimensions, usually they are all that are available. In this instance, however, we have the benefit and experience of the results of the 20 gauge interlock programme on which to draw and we would like to be able to use the STARFISH model to predict the finishing targets for the 28 gauge fabrics.

An examination of the grey data is therefore doubly important before finishing trials get underway. Firstly, to establish the actual stitch length in the fabrics, as this is a primary input for STARFISH, and how closely this corresponds to the nominal, target figures. Secondly, to assess the general trends to see if they follow those of the 20 gauge fabrics. Thirdly, to compare the results with the existing predictions based on the 20 gauge results and, finally, to check whether it is possible to improve the correlation by combining the data from both trials as this may improve our ability to set more accurately the finishing targets for the 28 gauge fabrics.

2.2. Comparison of Stitch Length Measured on the Machine with that Measured in the Fabric in the Laboratory

Figure 1 confirms that the stitch length recorded by the Welmstar run-in meter going into the fabric was essentially the same as the target figure. However, to confirm that the stitch length in the fabric as measured in the laboratory was also essentially the same, these figures have also been compared.

Figure 2 shows the linear regression analysis of the data from on-machine estimates for stitch length and those measured in the fabric in the laboratory. Although there is a high degree of correlation, as indicated by the r^2 figure of ~0.99, the line does not pass through or close to the origin, which would have been expected if there were no difference between the two sets of measurements. *Figure 3* illustrates this point more clearly. The estimates for stitch length from the fabric are, in all but one case, higher than the nominal or target figure which has already been shown to be the same as that recorded on the machine.

Table 5 examines this point in a different way. The mean % differences between the target and on-machine measurements and the on-machine and laboratory measurements have been calculated. The former confirms that there is essentially no difference between target and on-machine estimates for stitch length, but the latter shows that the stitch length as measured in the fabric is higher than that recorded during knitting by approximately 1.5%. *Figure 4* illustrates this last point graphically.

For the 28 gauge, although generally the variation in the results is better than ±1% (the published accuracy of the instrument) the mean is approximately 1.5% greater than target, whereas for the 20 gauge, which are included here for comparison, the results indicate an opposite trend. The mean measurements of stitch length are very close to target but the variation or scatter is generally larger.

These results would therefore seem to indicate that our Welmstar course length meter may be out of calibration by approximately 1.5% (i.e. 1.5% more yarn is being fed into the fabric than the readings would suggest), whereas the Welmstar instrument used for the 20 gauge trials, which belonged to the company where the knitting was carried out, was in much closer calibration, although the overall variability was higher.

The other important point to be made as a result of these observations is that it would be unwise in the context of our own 28 gauge fabrics to use the nominal stitch length as an input for the model when making predictions for finishing, as this would immediately build in an error of 1.5% on stitch length in the as-knitted fabric.

If, after further investigation, our Welmstar instrument is confirmed to be out of calibration, it may be advisable to have it recalibrated by the manufacturers although it is of course always possible to introduce a correction factor when it is being used.

2.3. Fabric Test Results and General Trends

Table 6 lists the full fabric test data as reported by the laboratory, and *Figures 5-10* illustrate some of these results, for relaxed dimensions, as a function of the grey-relaxed stitch length.

The general trends for courses, wales, weight, thickness and shrinkage follow those already established in previous trials and can be confirmed by consulting the relevant *Research Records*.

To summarise:

- Courses and wales per unit length increase as stitch length decreases.
- Weight increases as stitch length decreases and yarn count gets heavier.
- Thickness increases as stitch length increases.
- Length shrinkage increases as stitch length increases.
- Width shrinkage decreases as stitch length increases.

2.4. Comparison with STARFISH Predictions for 20 Gauge Interlock

Table 7 and *Figure 11* illustrate the result of using the STARFISH model, based on 20 gauge fabrics, to predict the dimensions of the 28 gauge fabrics in their grey-relaxed condition.

The inputs for the model were stitch length averaged over yarn counts, as measured in the as-received grey fabric, and the actual yarn count measured from the cone before knitting.

At first glance the output of the model in terms of courses, wales and weight would seem to correspond reasonably closely to the actual measurements. However, on closer study a few salient points emerge. The changes in stitch length and yarn tex predicted by the model do not correspond very closely to those observed by the laboratory and although the prediction for courses is indeed generally quite close, the predicted wales are consistently higher than those observed. Weight is predicted less accurately for the finer yarns.

To investigate this point further a regression analysis along the lines carried out for the 20 gauge data was performed on the 28 gauge results. *Figures 12-23* illustrate the results for tex, stitch length, courses, wales, weight and stitch density: The equivalent graphs illustrating the 20 gauge results are included to enable direct comparisons to be made.

From an examination of these results the reason for the discrepancies becomes immediately apparent. Although individually the equations for each gauge describe their own data very well it is clear that the slopes are incorrect if either one is applied to the other. This is perhaps most obvious with the *tex* and *l* regressions, and explains why the predicted changes in *tex* and *l* become less correct as the yarn becomes finer and stitch length shorter. Courses could be quite accurately described by the 20 gauge equation but there is apparently a much more significant effect of yarn count in the finer fabrics. However, for wales the slopes are quite different with again a more pronounced effect of yarn count in the 28 gauge fabrics. Weight is not too dissimilar as indeed neither is Stitch Density, *S*, but this is perhaps due to a compensatory effect in the changes between courses and wales.

Although the individual equations for each gauge do not permit accurate extrapolation, the general trends of the individual results do suggest that it may be possible to produce a set of equations which would adequately describe both sets of data. Consequently, the analysis was repeated on the combined 20 and 28 gauge data.

2.5. Analysis of the Combined 20 and28 Gauge Data

Figures 24-29 illustrate the results of the analysis of the combined data for tex, stitch length, courses, wales, weight and stitch density. *Table 8* gives the equations and the individual coefficients for both the 20 gauge and 28 gauge separately and also the combined analysis.

In all but one case, that of weight, by calculating the regression coefficients using both sets of data the r^2 is the same or improved, and even in the case of weight the slight loss in correlation with the individual 28 gauge results is compensated for by the improvement in the 20 gauge correlation.

These results are therefore significant. If the 20 gauge equations for grey fabrics cannot adequately describe the changes in 28 gauge grey fabric it is also unlikely that the changes in finished dimensions will be accurately predicted. An examination of the finished relaxed data for 20 gauge Interlock in conjunction with the combined equations for grey fabric may therefore prove to be a worthwhile exercise. By comparing the trend of these results it may be possible to arrive at more accurate estimates for the finishing targets for the 28 gauge fabric than are likely to be achieved from the 20 gauge model alone.

These results also serve to reconfirm the importance of including at least 2 gauges of machine per structure, both to reduce any possible bias in the slopes of the equations and, in addition, to eventually enable extrapolations to be made using the model with far greater security.

So far we have, with justification, kept the analysis of the different structures included in the knitgoods programme separate. However, in terms of the two most important input parameters for the model, *tex* and *l*, it may be possible to include all the data for combined analysis as, in this way, if it were possible, an extremely wide range of values would then already be available on which to develop very accurate equations. To test if this may be possible two plots were made comparing *tex* as-knitted against *tex* grey-relaxed, and stitch length as-knitted against stitch length grey-relaxed.

Figures 30 & 31 are the results and include all the data from both the double and single jersey trials, with the exception of the single jersey spirality trial. Although the regression coefficients have not at this stage been calculated it would appear that, at least for changes from as-knitted to grey-relaxed, it would not be unreasonable to attempt to develop universal equations for tex and stitch length. The implication is that yarn shrinkage and weight loss during the Reference Relaxation procedure are about the same regardless of fabric type, and this possibility should be considered for inclusion in the second stage analysis.

2.6. Conclusions

1. From the evidence of the 28 gauge knitting trials it would appear that our Welmstar course length counter may need recalibration.

   In addition, because the stitch length in the fabric as measured in the laboratory is approximately 1.5% higher than nominal it may be unwise to use the nominal values when making predictions for these fabrics.

2. Although the general trends for 20 and 28 gauge fabrics are similar, predictions based on the 20 gauge results alone do not describe the 28 gauge fabrics sufficiently accurately. Neither do the equations developed from the 28 gauge data describe the 20 gauge fabrics adequately.

3. On the evidence of the grey fabrics good correlation for both 20 and 28 gauge fabrics can be obtained by developing equations using the combined data from both trials which, with the exception of fabric weight, have r^2 results the same or superior to those obtained using the individual data.

4. As far as yarn count and stitch length are concerned, it may be possible to develop a set of universal equations which describe equally accurately the changes in those two parameters in interlock, rib, and plain single jersey structures.

Table 1

KNITTING PLAN

28 GAUGE INTERLOCK

FABRIC CONSTRUCTION AND TIGHTNESS FACTORS

28 gauge Interlock Kirkland DJK 48K, 30" Diamater, 48 feeders, 2640 x 2 needles

YARN COUNT		STITCH LENGTH CM (TIGHTNESS FACTOR)				
Ne 1-50	ℓ	0.236	0.248	0.260	0.273	0.287
	K	(14.6)	(13.9)	(13.2)	(12.6)	(12.0)
Ne 1-60	ℓ	0.236	0.248	0.260	0.273	0.287
	K	(13.3)	(12.6)	(12.1)	(11.5)	(10.9)
Ne 1-70	ℓ	0.236	0.248	0.260	0.273	0.287
	K	(12.3)	(11.7)	(11.2)	(10.6)	(10.1)

Tightness Factor $K = \frac{\sqrt{Tex}}{1 \text{ cm}}$

ℓ = stitch length

Table 2

28 GAUGE INTERLOCK

ORDER OF KNITTING

NE	SL CM	COURSE LENGTH	PIECE NO	
1/50	.236	623	1	2
1/60	.236	623	1	2
1/70	.236	623	1	2
1/70	.248	655	1	2
1/60	.248	655	1	2
1/50	.248	655	1	2
1/50	.260	686	1	2
1/60	.260	686	1	2
1/70	.260	686	1	2
1/70	.273	721	1	2
1/60	.273	721	1	2
1/50	.273	721	1	2
1/70	.287	758	1	2
1/60	.287	758	1	2
1/50	.287	758	1	2

Piece No. 1 = 50 metres
Piece No. 2 = 45 metres

length of piece calculated from off machine grey dimensions

Course length = stitch length x 2640

Course length to be measured by a Welmstar electronic run-in meter, at the beginning and end of every piece.

Knitting tensions to be maintained between 3-5 grams

Table 3

PRELIMINARY YARN TESTING

NOMINAL YARN COUNT Ne	MEAS. YARN COUNT Ne	TEX	TURNS/ INCH	TWIST FACTOR	FRICTION AGNST STEEL
1-50	49.12	12.02	27.49	3.92	0.12
1-60	62.47	9.45	29.62	3.75	0.17
1-70	71.40	8.27	31.14	3.69	0.15

NOMINAL YARN COUNT Ne	SINGLE END STRENGTH G	% EXTENSION AT BREAK	TWIST LIVELINESS DRY		TWIST LIVELINESS WET	
			TURNS	TW	TURNS	TW
1-50	218.8	7.55	53.8	0.84	52.3	0.82
1-60	157.0	6.54	57.8	0.91	57.0	0.89
1-70	134.8	6.65	60.9	0.95	56.1	0.88

Table 4

Machine: KIRKLAND DJK 48K Gauge: 28 No. of Needles: 2640 x 2

No. of Feeders: 46 IN USE Machine Diameter: 30 INCH

PIECE NO.	COURSE LENGTH TARGET	MEAN CL AT START OF PIECE	MEAN CL AT END OF PIECE	C/3CM ON MACHINE		C/3CM OFF MACHINE	BOARD WIDTH (CM)	WIDTH ON ROLL (CM)	REVS PRODUCED	PIECE WEIGHT Kg.
				Start	End					
I 8/1-50/236/1	623	623	630			58	88.5	90	4620	14.86
I28/1-50/236/2	623	620	621			58	88.5	90	3783	12.59
I°8/1-60/236/1	623	622	621			60	88.5	90	4347	11.23
I 3/1-60/236/2	623	622	621			60	88.5	90	3912	10.89
I28/1-70/236/1	623	622	621			58	88.5	90	4202	8.73
I 3/1-70/236/2	623	622	621			58	88.5	90	3783	7.94
I28/1-70/248/1	655	654	656			56	88.5	90	4057	9.53
I°9/1-70/248/2	655	656	656			56	88.5	90	3652	9.07
I ./1-60/248/1	655	656	656			53	88.5	90	3840	10.09
I28/1-60/248/2	655	656	656			53	88.5	90	3456	10.43
I :/1-50/248/1	655	656	655			55	88.5	90	3985	12.81
I28/1-50/248/2	655	655	655			55	88.5	90	3586	12.93
I°9/1-50/260/1	686	686	685			53	88.5	91	3840	12.93
I 3/1-50/260/2	686	685	686			53	88.5	91	3200	11.79
I28/1-60/260/1	686	686	685			47	88.5	91	3405	9.41
I :/1-60/260/2	686	685	684			47	88.5	91	3064	9.07

Machine: KIRKLAND DJK 48K Gauge: 28 No. of Needles: 2640 x 2

No. of Feeders: 46 IN USE Machine Diameter: 30 INCH

PIECE NO.	COURSE LENGTH TARGET	MEAN CL AT START OF PIECE	MEAN CL AT END OF PIECE	C/3CM ON MACHINE		C/3CM OFF MACHINE	BOARD WIDTH (CM)	WIDTH ON ROLL (CM)	REVS PRODUCED	PIECE WEIGHT Kg.
				Start	End					
I28/1-70/260/1	686	685	686			46	88.5	91	3333	8.28
I 3/1-70/260/2	686	687	686			46	88.5	91	3000	7.82
I28/1-70/273/1	721	721	721			44	88.5	91	3188	8.39
I /1-70/273/2	721	721	722			44	88.5	91	2870	8.85
I 3/1-60/273/1	721	722	721			43	88.5	91	3116	9.07
I28/1-60/273/2	721	722	722			43	88.5	92	2804	9.07
I 3/1-50/273/1	721	721	722			45	88.5	92	3260	11.34
I28/1-50/273/2	721	721	721			45	88.5	92	2935	11.45
I :/1-70/287/1	758	758	757			41	88.5	92	2971	7.71
I ./1-70/287/2	758	757	757			41	88.5	92	2674	7.71
I28/1-60/287/1	758	757	756			40	88.5	92	2899	8.73
I :/1-60/287/2	758	758	757			40	88.5	92	2609	8.73
I28/1-50/287/1	758	758	758			41	88.5	92	2971	10.66
I 3/1-50/287/2	758	757	756			41	88.5	92	2674	10.89

Table 5

28 GAUGE INTERLOCK

COMPARISON OF STITCH LENGTH. TARGET/ON M/C/LAB BW

TARGET Nº S.L. mm	S.L. ON M/C $\bar{x}$ mm	% DIFFERENCE TARGET/ON M/C	S.L. LAB BW $\bar{x}$ mm	% DIFFERENCE ON M/C/LAB BW
1-50/2.36	2.361	+ 0.04	2.43	+ 2.97
2.48	2.482	+ 0.08	2.51	+ 1.21
2.60	2.596	- 0.15	2.62	+ 0.77
2.73	2.732	+ 0.07	2.77	+ 1.47
2.87	2.870	0	2.92	+ 1.74
1-60/2.36	2.354	- 0.25	2.36	0
2.48	2.484	+ 0.16	2.52	+ 1.61
2.60	2.594	- 0.23	2.64	+ 1.54
2.73	2.733	+ 0.11	2.78	+ 1.83
2.87	2.867	- 0.10	2.89	+ 0.70
1-70/2.36	2.354	- 0.25	2.40	+ 1.69
2.48	2.482	+ 0.08	2.52	+ 1.61
2.60	2.598	- 0.08	2.66	+ 2.31
2.73	2.732	+ 0.07	2.79	+ 2.20
2.87	2.868	- 0.07	2.91	+ 1.39
		$\bar{x}$ -0.0346		$\bar{x}$ +1.536

Table 6

28 GAUGE INTERLOCK

GREY FABRIC TEST RESULTS - MEASURED PARAMETERS

SAMPLE	StL.BW G	StL.AW G	Y.He G	Y.Str. G	%Ext. G	%Shr.L G	%Shr.W G
I50/236	2.429	2.397	51.35	169.4	7.8	14.5	25.9
I50/248	2.512	2.486	52.26	175	8	15.6	24.8
I50/260	2.621	2.603	52.73	177.8	8	20.2	21.8
I50/273	2.772	2.759	51.8	178.1	7.9	25.4	17.4
I50/287	2.916	2.861	51.8	181.4	8.2	23	15.3
I60/236	2.363	2.353	63.5	141.8	7.3	16.2	28.7
I60/248	2.524	2.478	63.5	138.1	7.5	21.1	25.6
I60/260	2.639	2.605	63.5	134.7	7.2	23.1	20.3
I60/273	2.776	2.742	62.16	134.1	7.2	23.1	20
I60/287	2.887	2.871	63.5	136.5	7.5	25.1	19.5
I70/236	2.397	2.336	72.91	112.5	7.2	18.6	28.7
I70/248	2.524	2.492	72.02	125.1	7.6	20.1	26.8
I70/260	2.658	2.599	72.02	114.2	7	22.7	25.3
I70/273	2.788	2.728	73.82	112.7	7.3	24	21.9
I70/287	2.912	2.88	73.82	113.5	7	24.9	19.3

28 GAUGE INTERLOCK

GREY FABRIC TEST RESULTS - MEASURED PARAMETERS

SAMPLE	C/3cmB G	C/3cmA G	W/3cmB G	W/3cmA G	Wt.BW G	Wt.AW G	Wid.BW G
I50/236	60.7	70.8	41.6	56.2	157.1	237.2	92.5
I50/248	58	68	42.1	56.2	161.9	235.1	92.6
I50/260	51.3	64.2	42.7	54.7	147.5	226.2	92.4
I50/273	45	59.7	44.9	54.2	138.8	216	90.1
I50/287	43.4	56.9	45.2	53.4	145	211	87.7
I60/236	60.1	71.5	42.1	59.7	126.3	205.5	92.8
I60/248	52.9	66.8	43.6	58.4	120.2	195.7	91.4
I60/260	47.8	62.2	45.1	56.9	118.7	183.1	87.9
I60/273	45.3	58.8	45.6	57.2	119.2	185.1	87.4
I60/287	41	55.6	45.7	56.8	113.3	173.5	86.1
I70/236	56.8	69.5	44.7	61.9	108.7	180.5	88.9
I70/248	52	66.2	45	61	107.6	174.7	87.7
I70/260	47.7	61.1	44.3	60	100.1	167.1	89.4
I70/273	44.7	57.8	46.8	59	102.3	161.7	84.6
I70/287	41.3	54	48.4	59.5	103.2	158	83.2

28 GAUGE INTERLOCK

GREY FABRIC TEST RESULTS - MEASURED PARAMETERS

SAMPLE	Spr.BW G	Spr.AW G	Bst.BW G	Bst.AW G	DistBW G	DistAW G	Thkns G
I50/236	0	0.2	796.5	775	14.4	21.7	998
I50/248	0.5	-0.4	763.4	792.2	14.7	21.8	1030
I50/260	0.6	-0.1	760.6	746.9	14.5	23	1032
I50/273	-1.9	0.3	745.9	726.4	13.7	22.2	1100
I50/287	-1.2	0.8	732.2	685.8	15	22.7	1114
I60/236	0	0	594.6	639.6	13.9	22	991
I60/248	-0.4	0.4	586.7	626.5	14	22.3	1000
I60/260	-2	1.3	608	573.2	13.7	22.3	1011
I60/273	-2.3	0.5	564.7	576.6	14.1	22.5	1061
I60/287	-1.4	0.8	563.9	544.9	14.3	22.6	1091
I70/236	0.5	0.1	471.3	522.7	13.6	22.6	967
I70/248	-0.2	0.4	478.1	508.6	14.2	22.6	989
I70/260	-0.9	1.5	476.6	495.9	13.8	22.4	1018
I70/273	-1.5	0.6	493.7	464.5	14.7	23	1041
I70/287	-1.6	0.8	486.8	436.6	15.1	22.7	1077

Table 7

***** IIC -STARFISH- MODEL PREDICTIONS *****

INTERLOCK: 28g 30 in. 2640 needles 23-SEP-82 15:31
Grey page 1

As knitted Yarn Ne	StLen cm	TF	Fin. relaxed Yarn Ne	StLen cm	TF	As delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)
						@ LxW Shrinkage = 0 x 0			
49.1	0.240	14.4	50.1	0.240	14.3	69.8	54.7	243.8	72.4
49.1	0.252	13.8	50.1	0.251	13.7	66.4	53.5	234.3	74.0
49.1	0.264	13.1	50.1	0.262	13.1	63.4	52.5	225.5	75.5
49.1	0.278	12.5	50.1	0.275	12.5	60.1	51.3	216.3	77.1
49.1	0.291	11.9	50.1	0.287	12.0	57.4	50.4	208.4	78.6
62.5	0.240	12.8	65.0	0.240	12.6	69.1	57.5	194.6	68.9
62.5	0.252	12.2	65.0	0.251	12.0	65.8	56.3	187.2	70.3
62.5	0.264	11.6	65.0	0.262	11.5	62.7	55.2	180.5	71.7
62.5	0.278	11.1	65.0	0.275	11.0	59.5	54.1	173.4	73.2
62.5	0.291	10.6	65.0	0.287	10.5	56.7	53.1	167.3	74.5
71.4	0.240	12.0	75.4	0.240	11.7	68.8	58.9	171.9	67.2
71.4	0.252	11.4	75.4	0.251	11.2	65.4	57.7	165.6	68.6
71.4	0.264	10.9	75.4	0.262	10.7	62.4	56.7	159.8	69.9
71.4	0.278	10.3	75.4	0.275	10.2	59.2	55.5	153.7	71.3
71.4	0.291	9.9	75.4	0.287	9.8	56.4	54.6	148.4	72.6

Table 8

INTERLOCK

PREDICTION OF FULLY RELAXED AVERAGE TEX FROM ACTUAL TEX AS KNITTED

MODEL $y = a + bx$

	a	b	r^2
20G grey	−0.9432	1.0508	0.9989
20G grey	0.6019	0.9144	0.9973
20 + 28G grey	−0.4563	1.0253	0.9982

PREDICTION OF FULLY RELAXED STITCH LENGTH FROM STITCH LENGTH AS KNITTED

MODEL $y = a + bx$

	a	b	r^2
20G grey	0.0164	0.9300	0.9622
28G grey	−0.0006	0.9886	0.9909
20 + 28G grey	0.0099	0.9491	0.9931

PREDICTION OF FULLY RELAXED WEIGHT FROM FULLY RELAXED AVERAGE TEX AND STITCH LENGTH

MODEL $y = a + b \text{ av. tex}/\ell$

	a	b	r^2
20G grey	30.6852	4.3265	0.9462
28G grey	29.7091	4.4510	0.9858
20 + 28G grey	37.8113	4.1990	0.9774

INTERLOCK

PREDICTION OF FULLY RELAXED C/CM FROM FULLY RELAXED AVERAGE TEX AND STITCH LENGTH

MODEL $y = a + b/\ell + c\sqrt{\text{av. tex}}$

	a	b	c	r^2
20G grey	−3.8255	5.9963	0.5897	0.9718
28G grey	−10.1740	6.7577	1.6597	0.9922
20 + 28G grey	−7.7727	6.4849	1.2217	0.9929

PREDICTION OF FULLY RELAXED W/CM FROM FULLY RELAXED AVERAGE TEX AND STITCH LENGTH

MODEL $y = a + b/\ell + c\sqrt{\text{av. tex}}$

	a	b	c	r^2
20G grey	17.1927	2.1388	−2.2681	0.9875
28G grey	24.7445	1.2548	−3.3452	0.9700
20 + 28G grey	22.4605	1.8847	−3.4035	0.9917

PREDICTION OF FULLY RELAXED STITCH DENSITY FROM FULLY RELAXED AVERAGE TEX AND STITCH LENGTH

MODEL $y = a + b/\ell^2 + c \text{ av. tex}$

	a	b	c	r^2
20G grey	111.3563	20.5830	−3.5407	0.9831
28G grey	157.9542	20.3579	−5.9831	0.9877
20 + 28G grey	145.7266	21.1731	−6.0523	0.9967

Figure 1

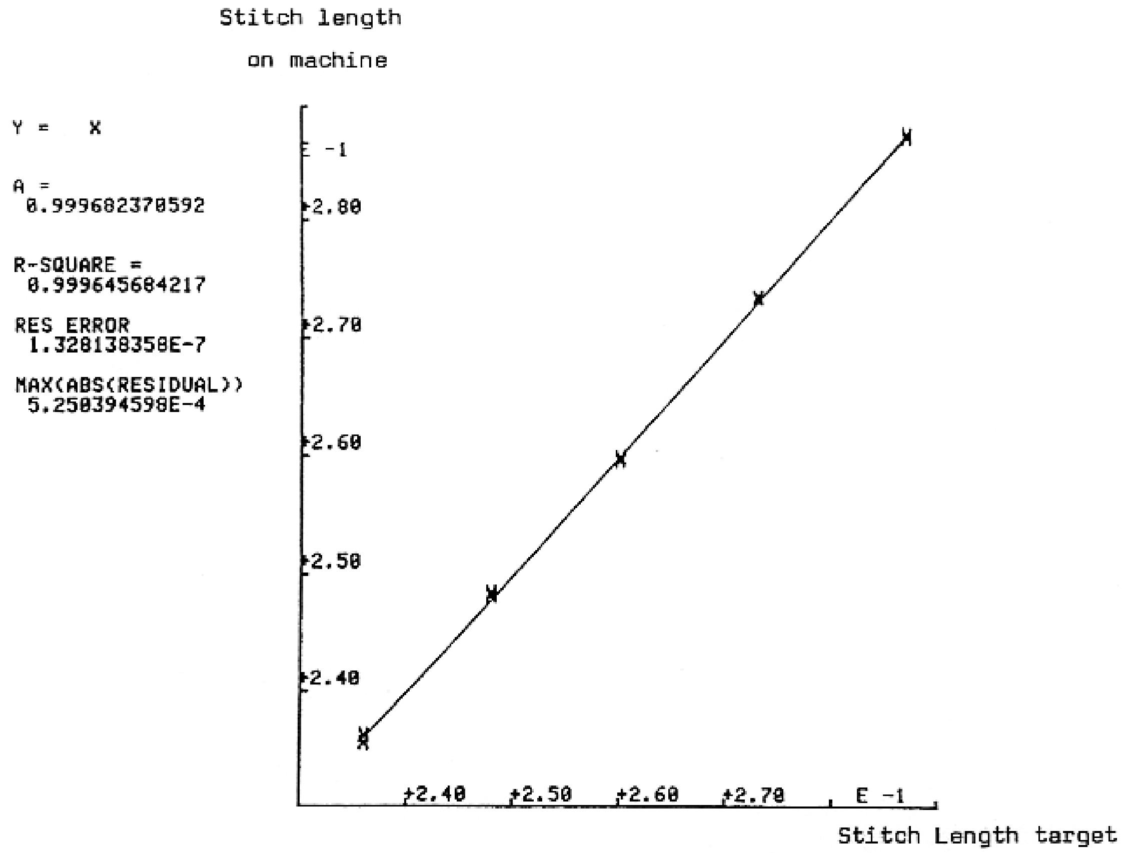


Figure 2

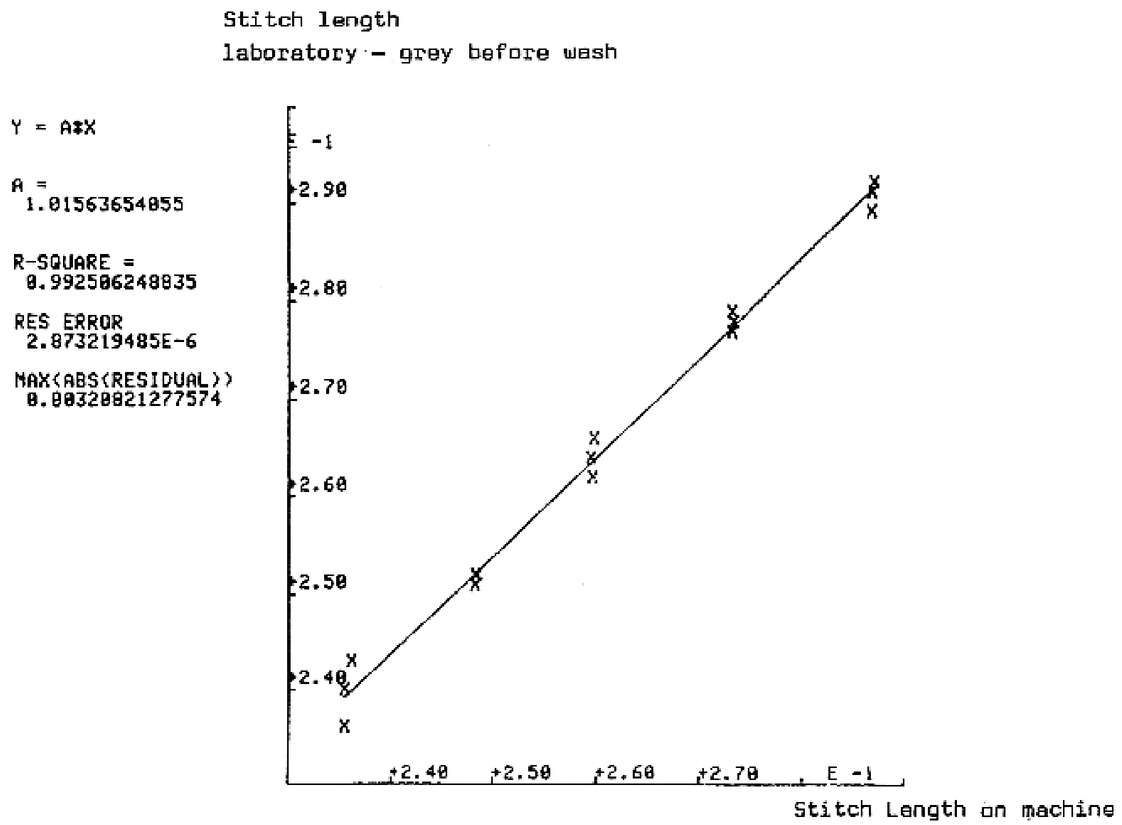
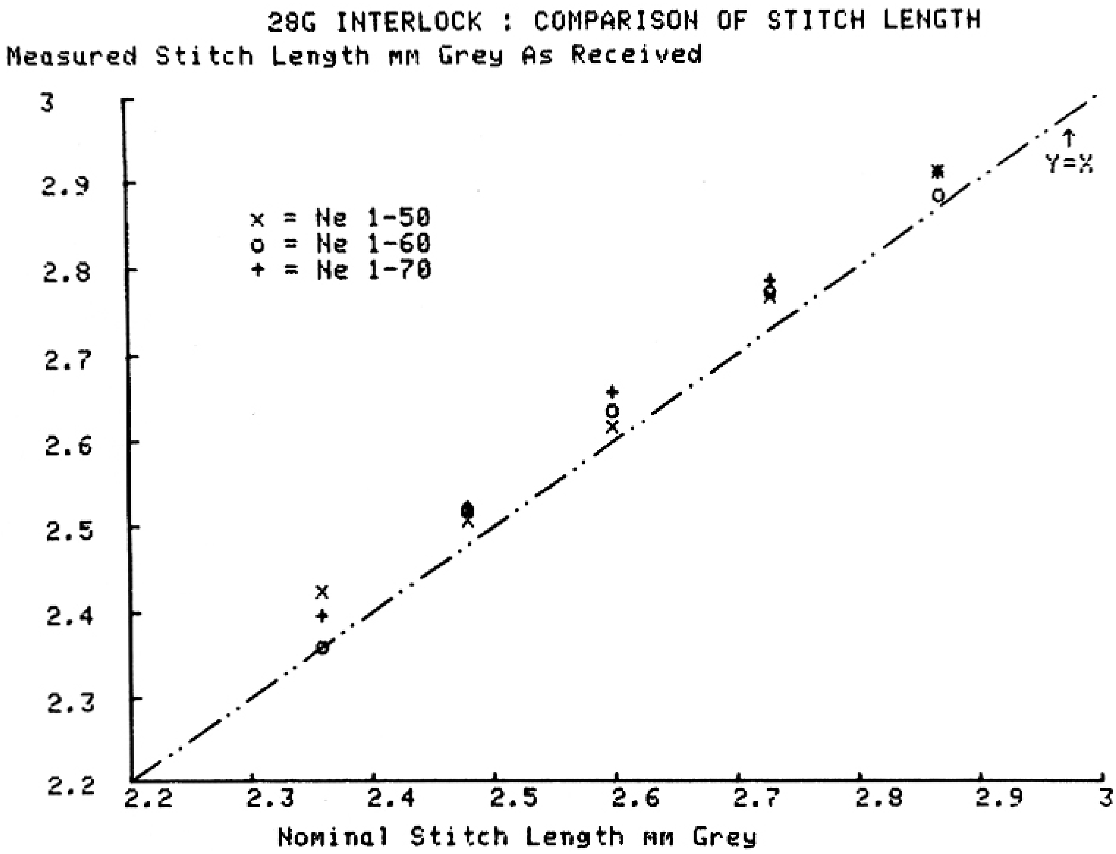


Figure 3



28G INTERLOCK : COMPARISON OF STITCH LENGTH
Measured Stitch Length mm Grey As Received
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
x = Ne 1-50
o = Ne 1-60
+ = Ne 1-70
Y=X
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
Nominal Stitch Length mm Grey

Figure 4

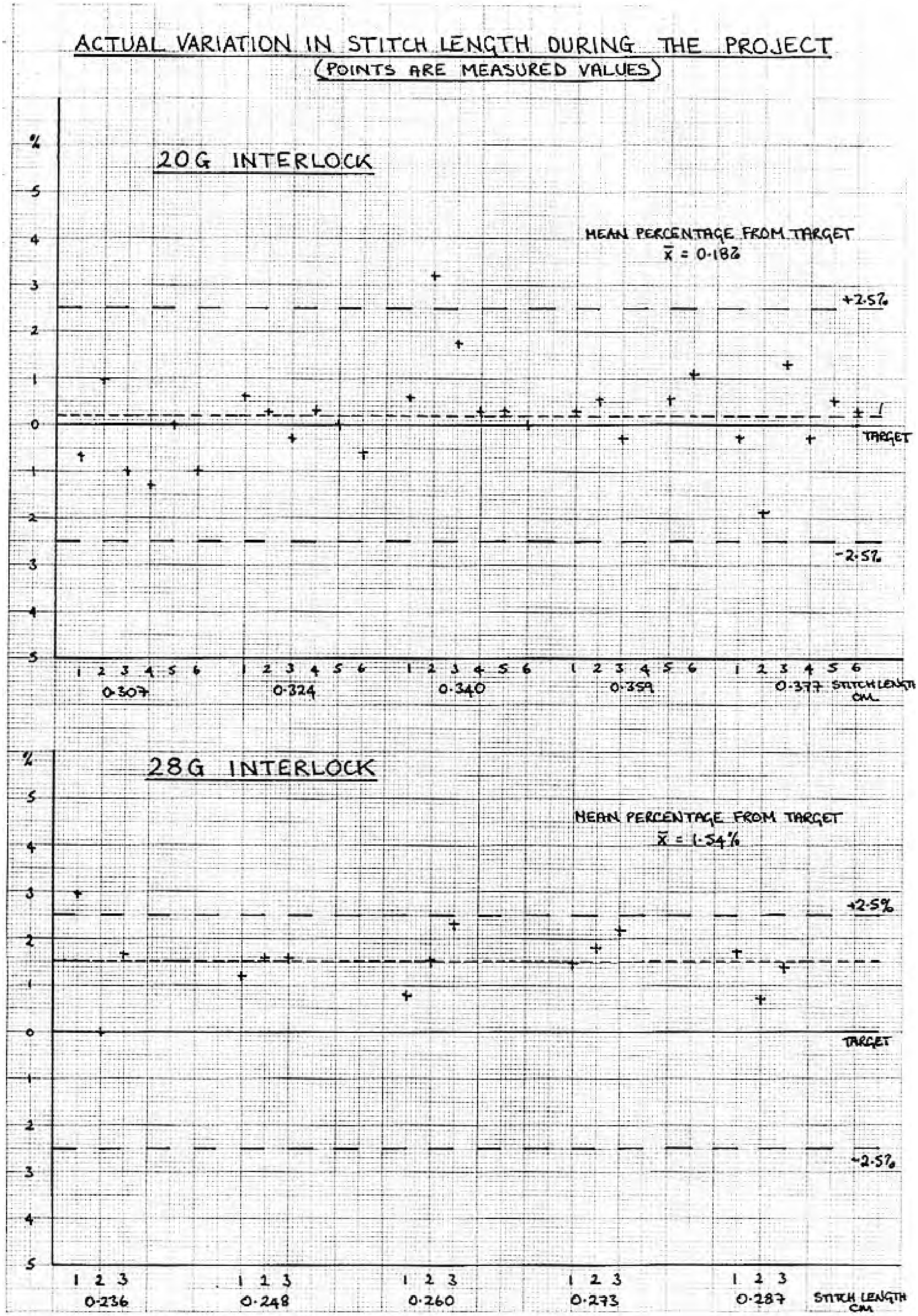

ACTUAL VARIATION IN STITCH LENGTH DURING THE PROJECT
(POINTS ARE MEASURED VALUES)
20G INTERLOCK
MEAN PERCENTAGE FROM TARGET
x̄ = 0·18%
+2·5%
TARGET
-2·5%
0·307
0·324
0·340
0·359
0·377
STITCH LENGTH CM
28G INTERLOCK
MEAN PERCENTAGE FROM TARGET
x̄ = 1·54%
+2·5%
TARGET
-2·5%
0·236
0·248
0·260
0·273
0·287
STITCH LENGTH CM

Figure 5

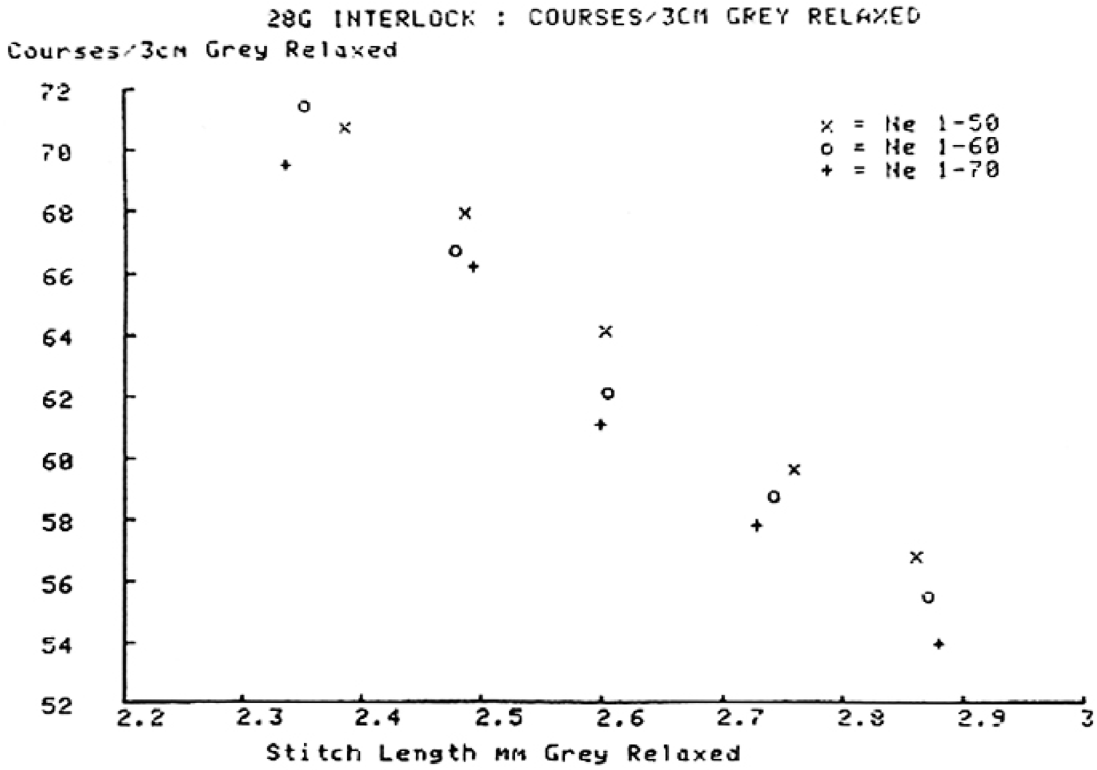


Figure 6

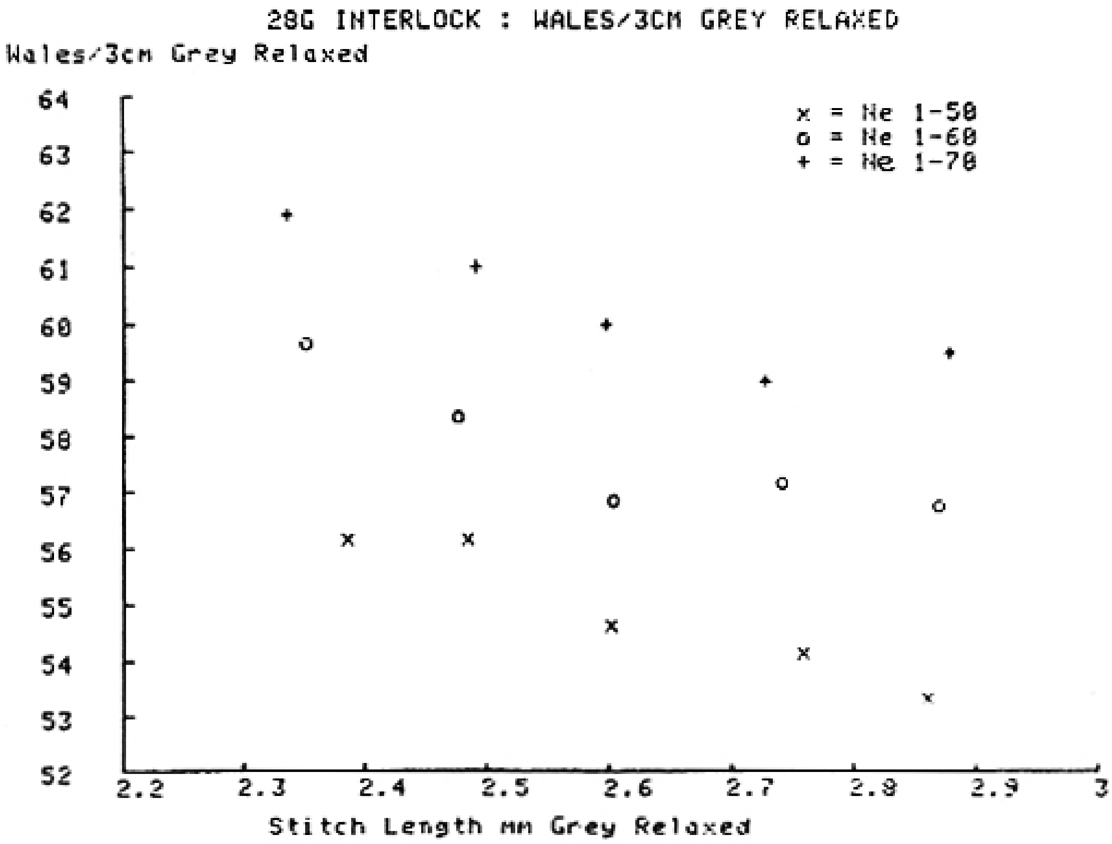


Figure 7

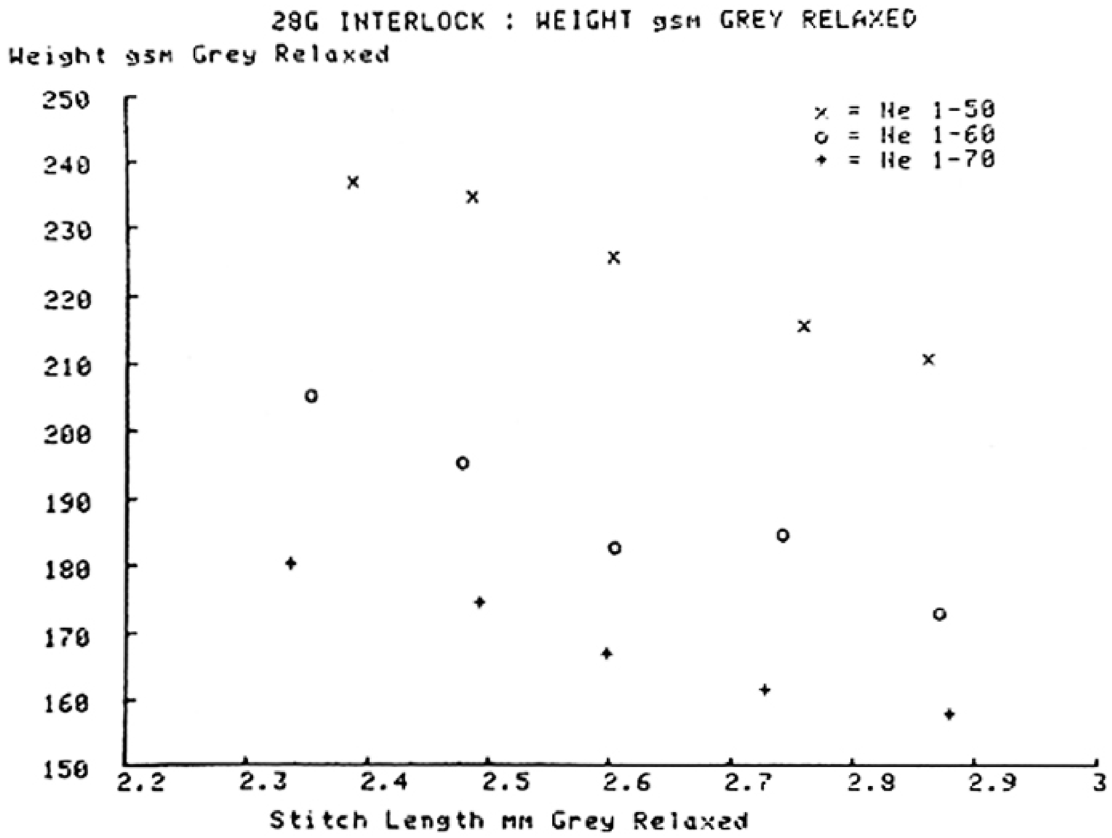


Figure 8

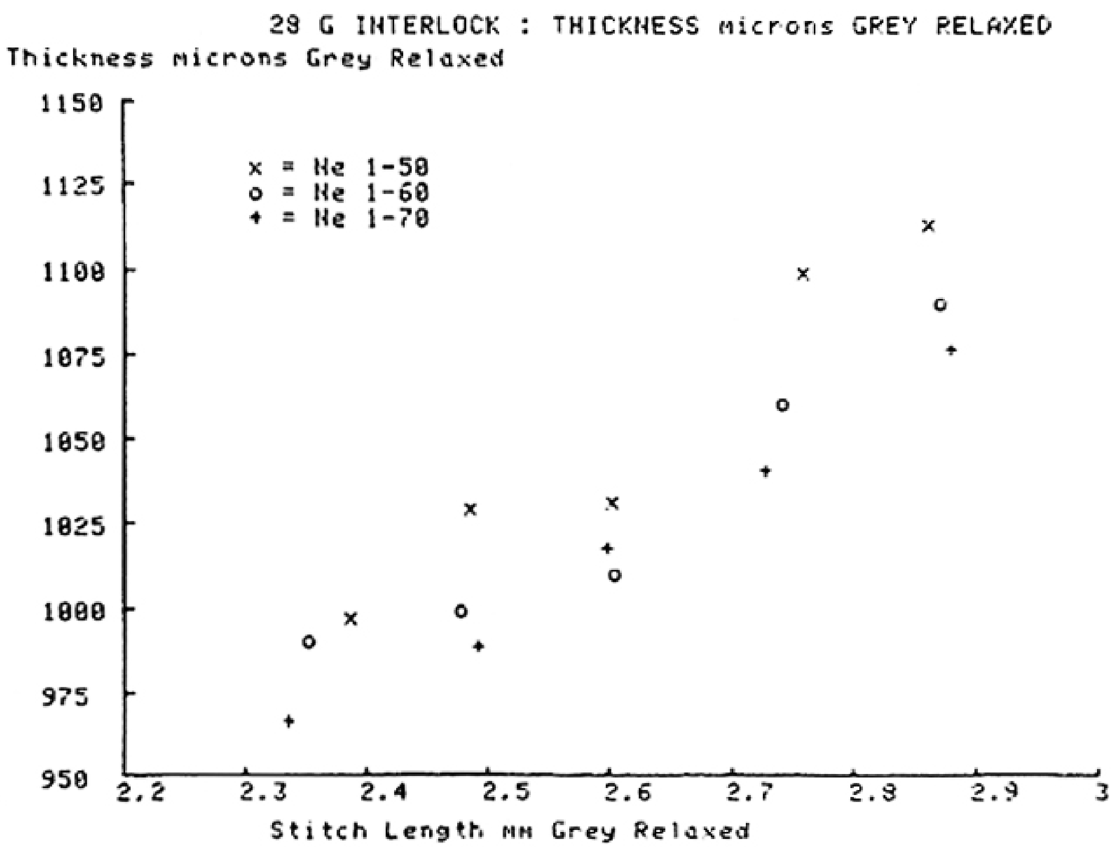


Figure 9

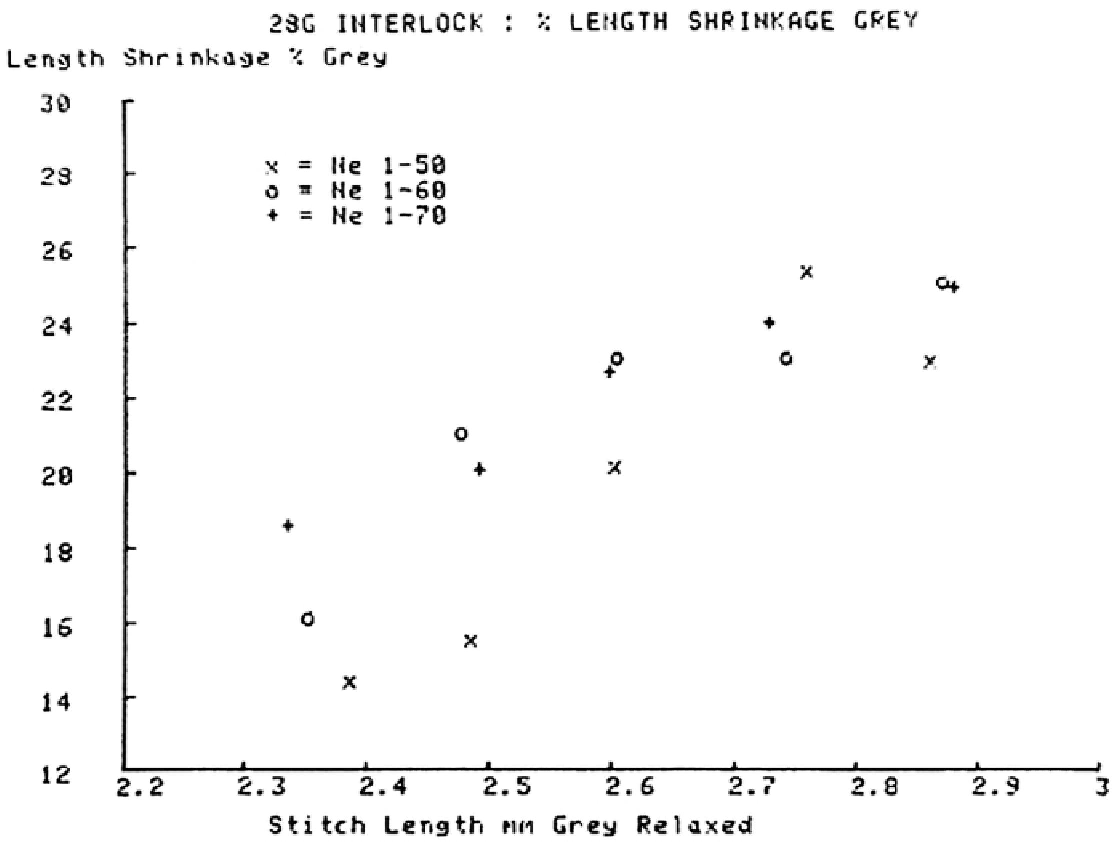


Figure 10

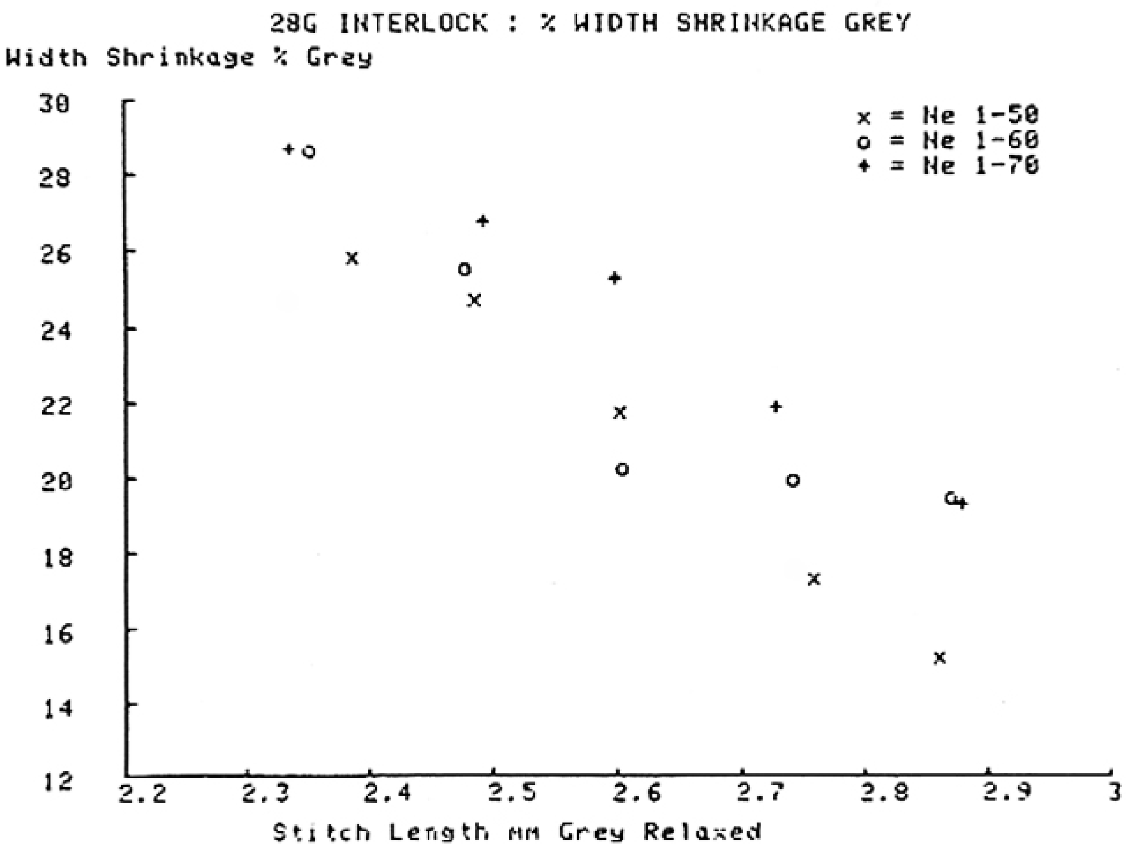
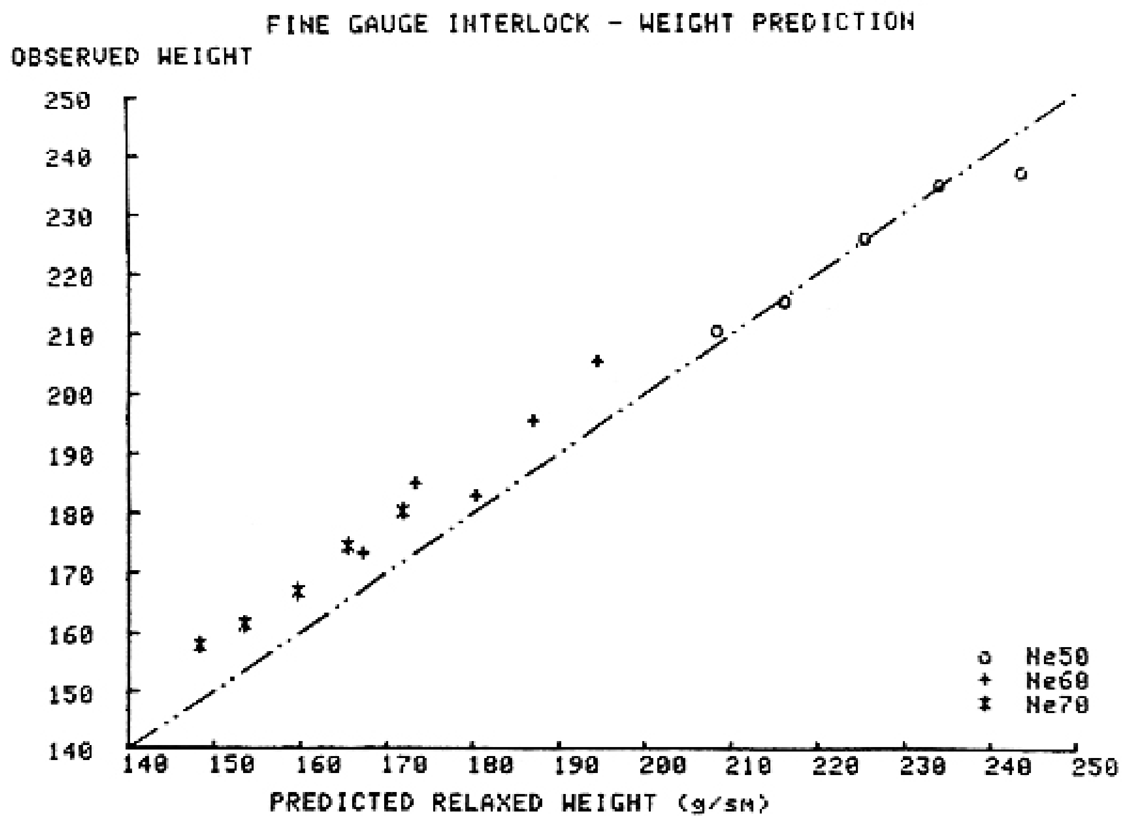


Figure 11


FINE GAUGE INTERLOCK - WEIGHT PREDICTION
OBSERVED WEIGHT
250
240
230
220
210
200
190
180
170
160
150
140
140 150 160 170 180 190 200 210 220 230 240 250
PREDICTED RELAXED WEIGHT (g/sm)
o Ne50
+ Ne60
* Ne70

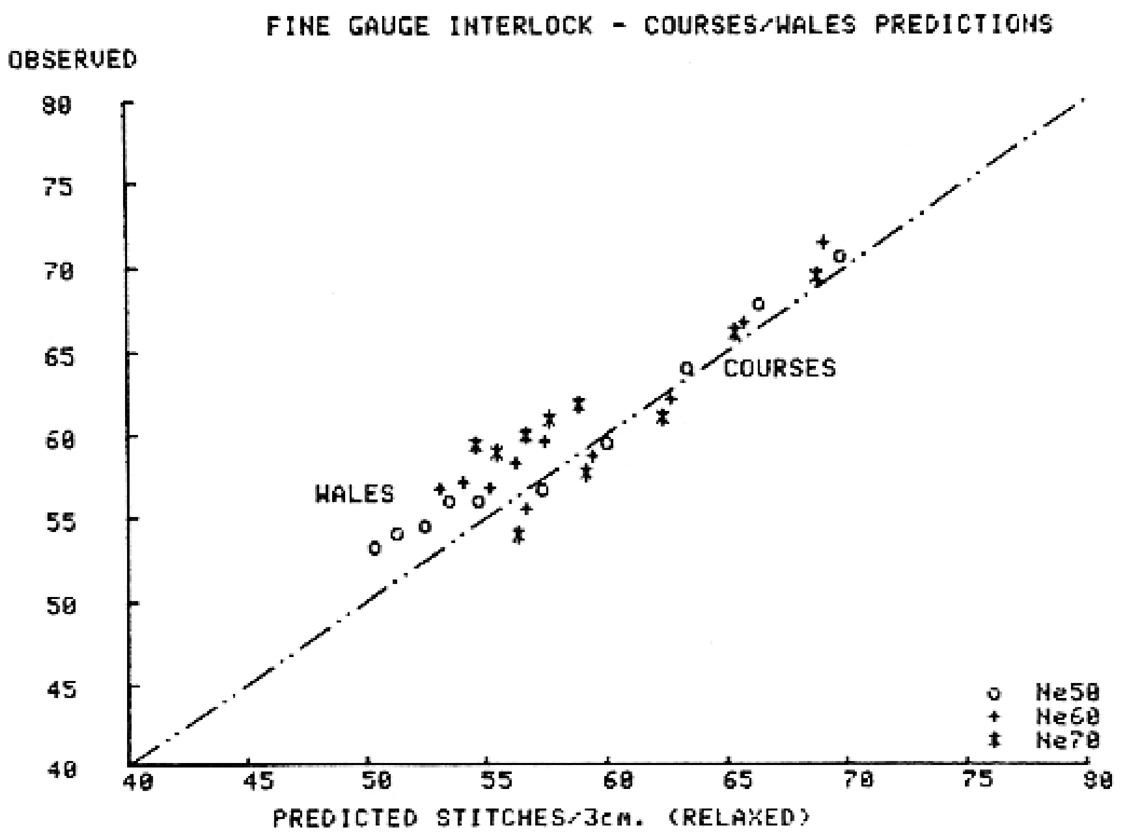
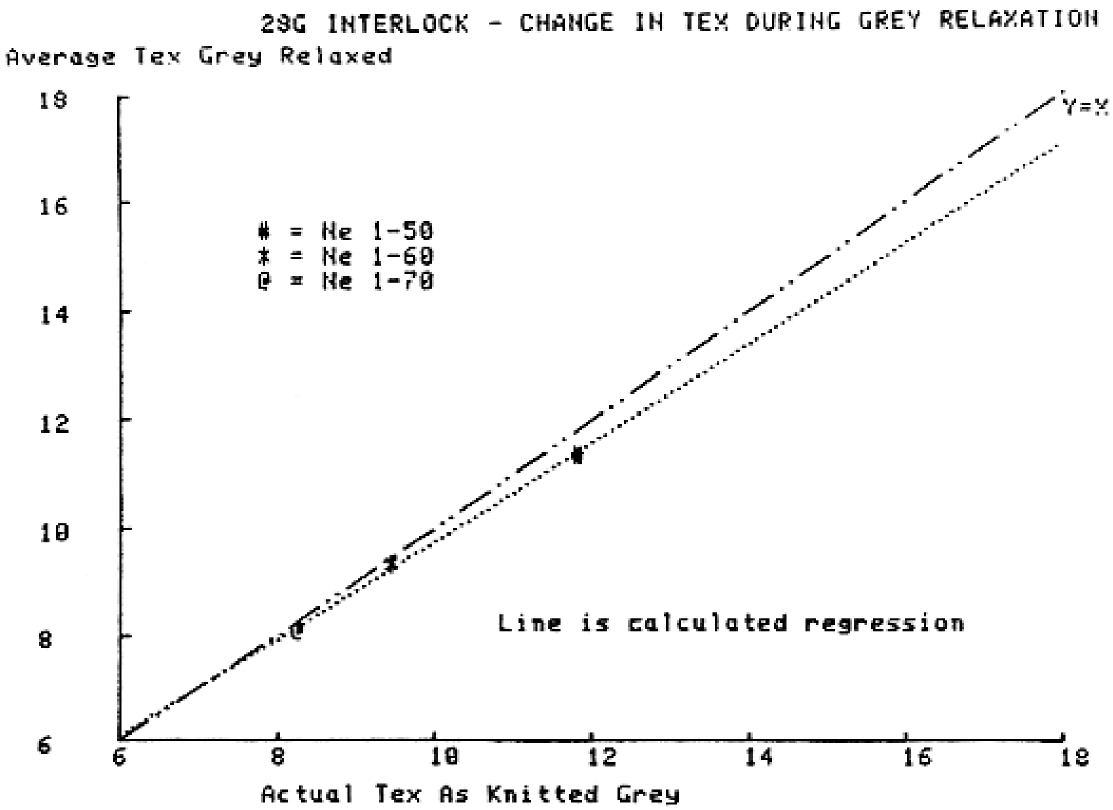

FINE GAUGE INTERLOCK - COURSES/WALES PREDICTIONS
OBSERVED
80
75
70
65
60
55
50
45
40
40 45 50 55 60 65 70 75 80
PREDICTED STITCHES/3cm. (RELAXED)
COURSES
WALES
o Ne50
+ Ne60
* Ne70

Figure 12


20G INTERLOCK - CHANGE IN TEX DURING GREY RELAXATION
Average Tex Grey Relaxed
6
8
10
12
14
16
18
Y=X
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Line is calculated regression
Actual Tex As Knitted Grey

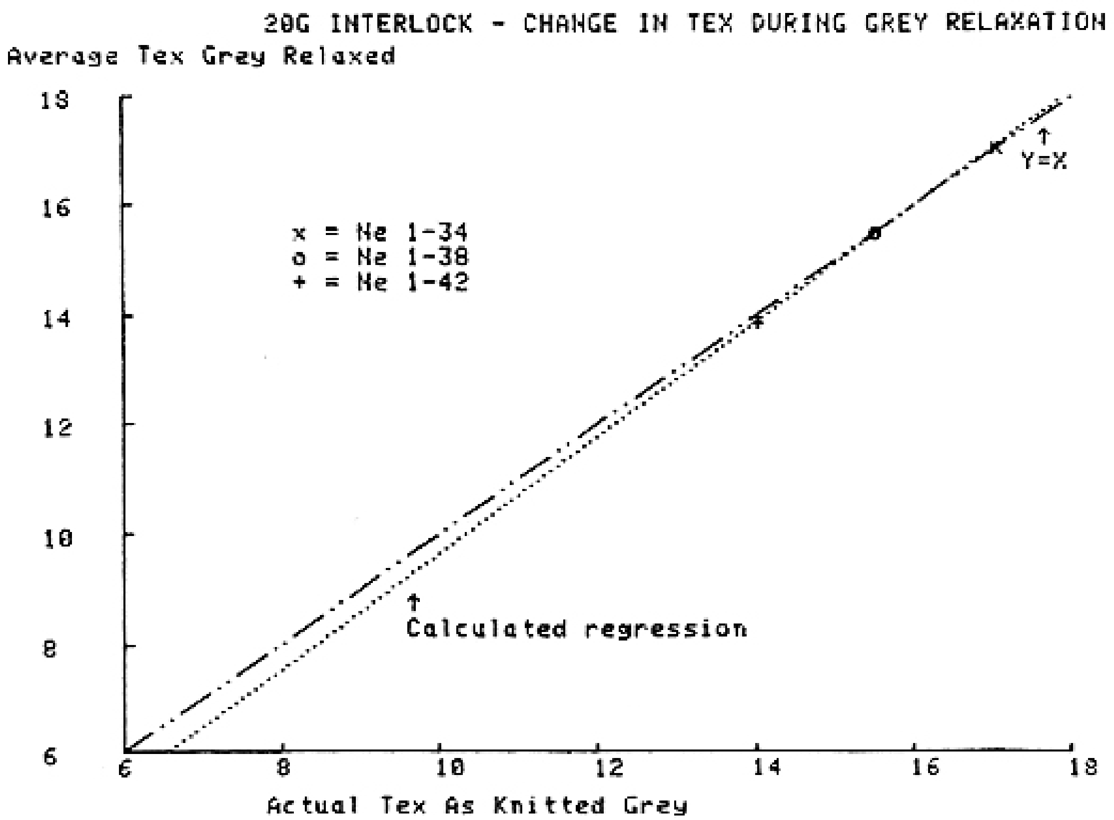
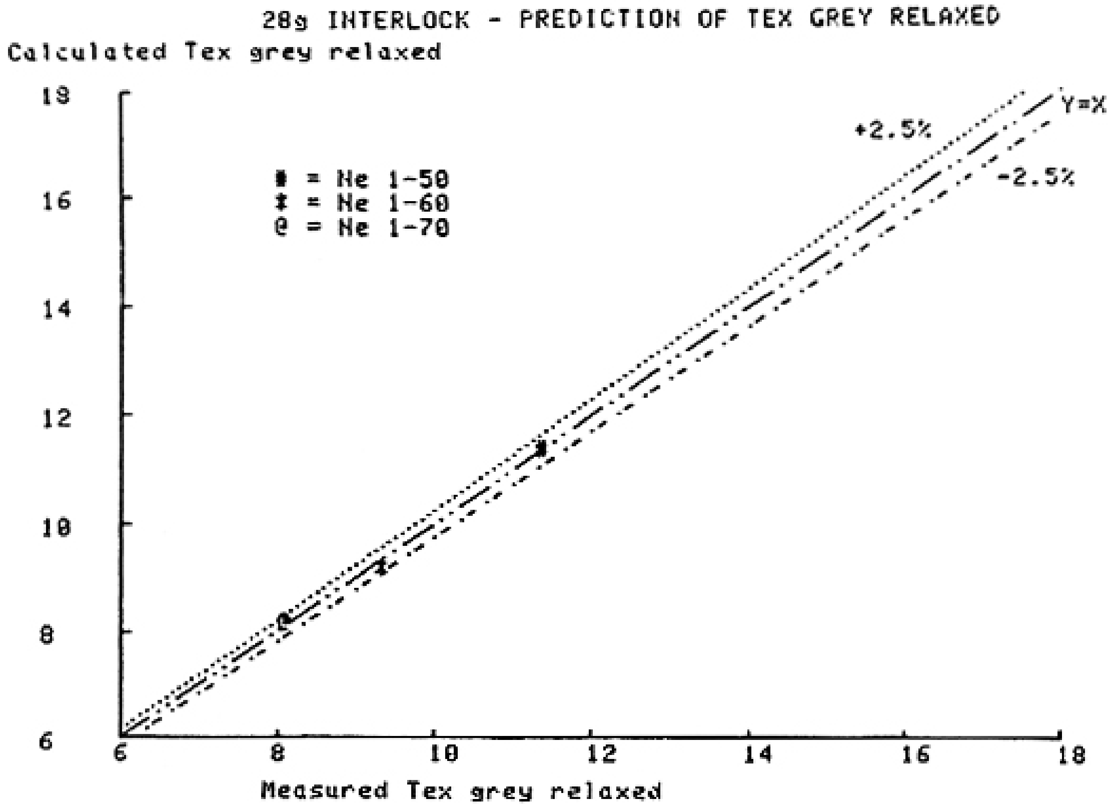

20G INTERLOCK - CHANGE IN TEX DURING GREY RELAXATION
Average Tex Grey Relaxed
6
8
10
12
14
16
18
Y=X
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Calculated regression
Actual Tex As Knitted Grey

Figure 13


28g INTERLOCK - PREDICTION OF TEX GREY RELAXED
Calculated Tex grey relaxed
= Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
+2.5%
Y=X
-2.5%
Measured Tex grey relaxed

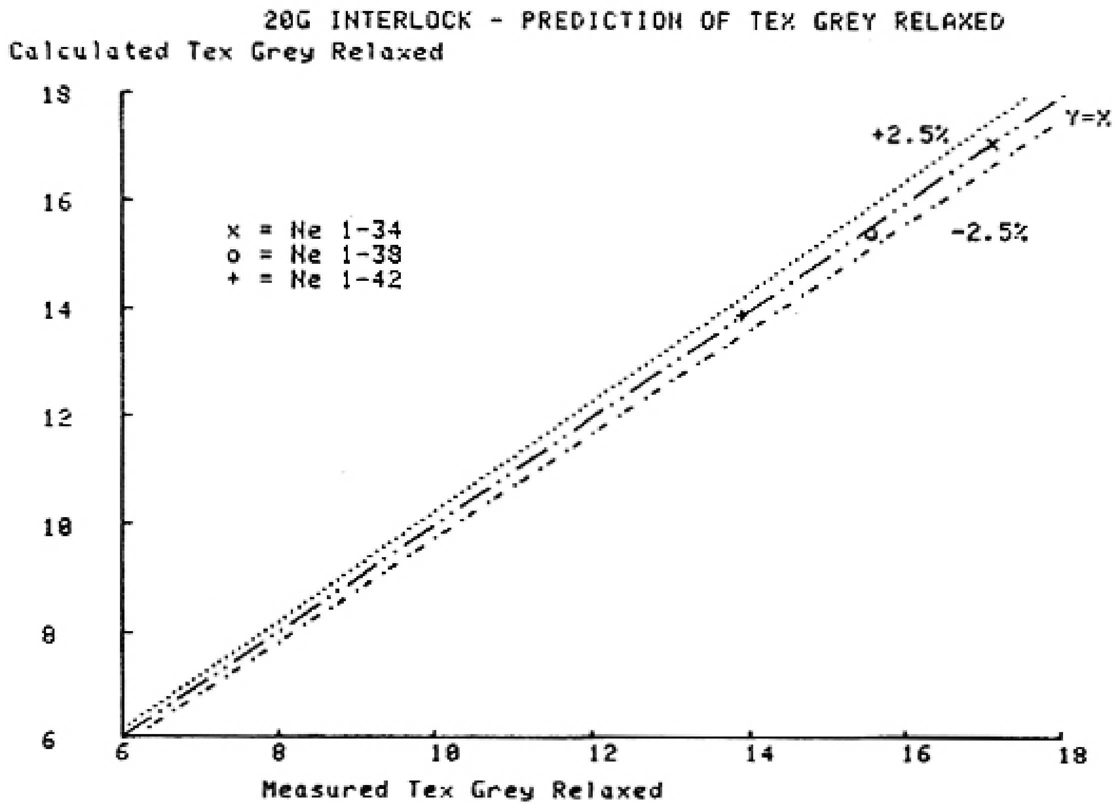
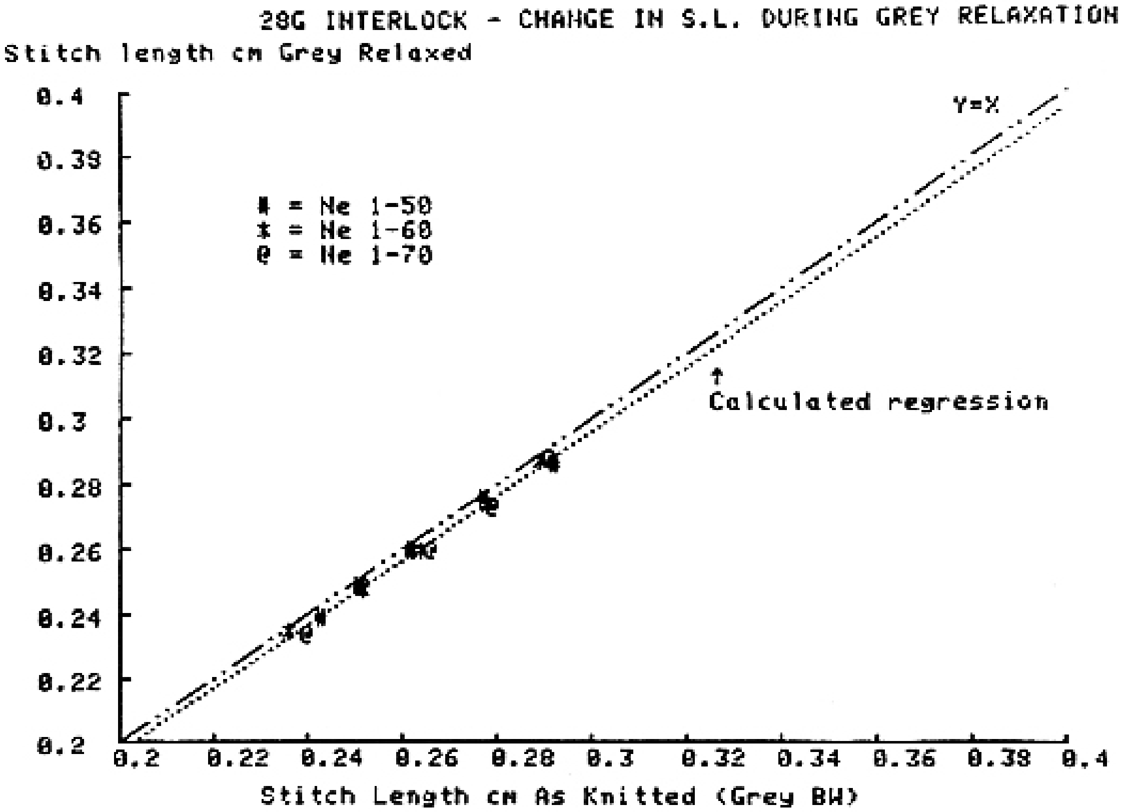

20G INTERLOCK - PREDICTION OF TEX GREY RELAXED
Calculated Tex Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
Y=X
-2.5%
Measured Tex Grey Relaxed

Figure 14


20G INTERLOCK - CHANGE IN S.L. DURING GREY RELAXATION
Stitch length cm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Y=X
Calculated regression
Stitch Length cm As Knitted (Grey BW)

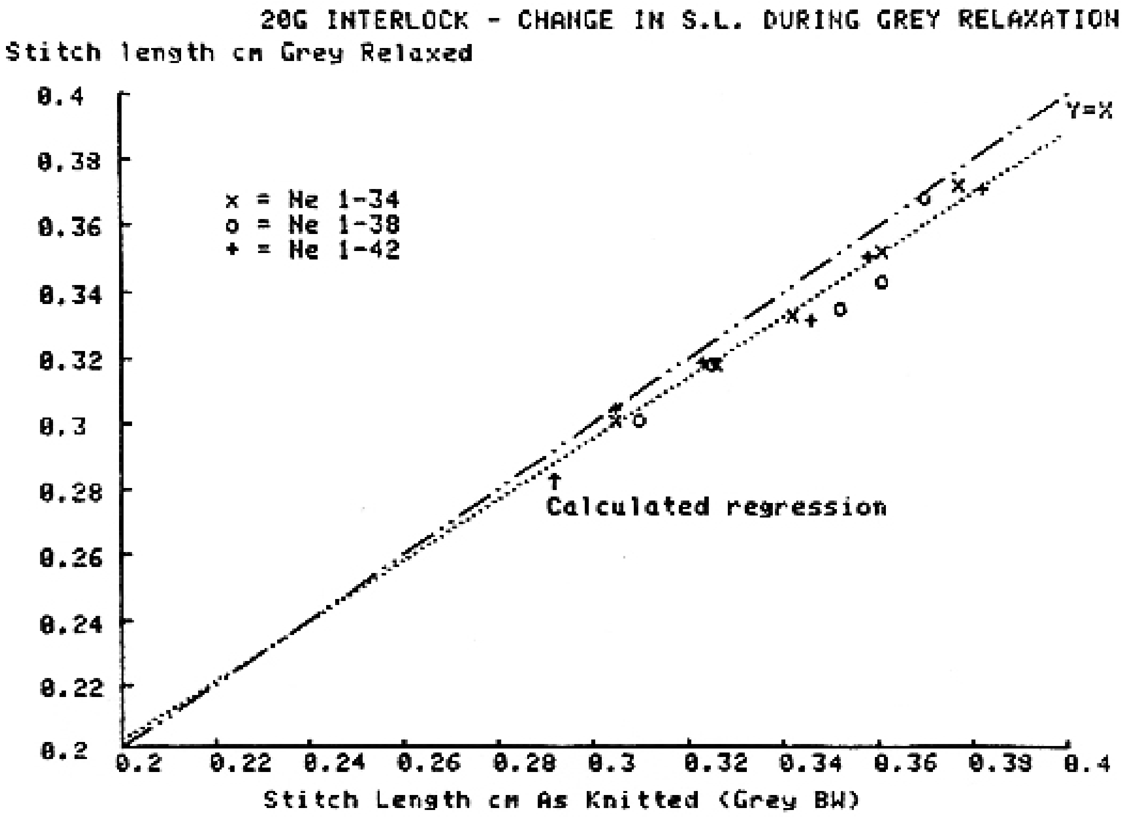
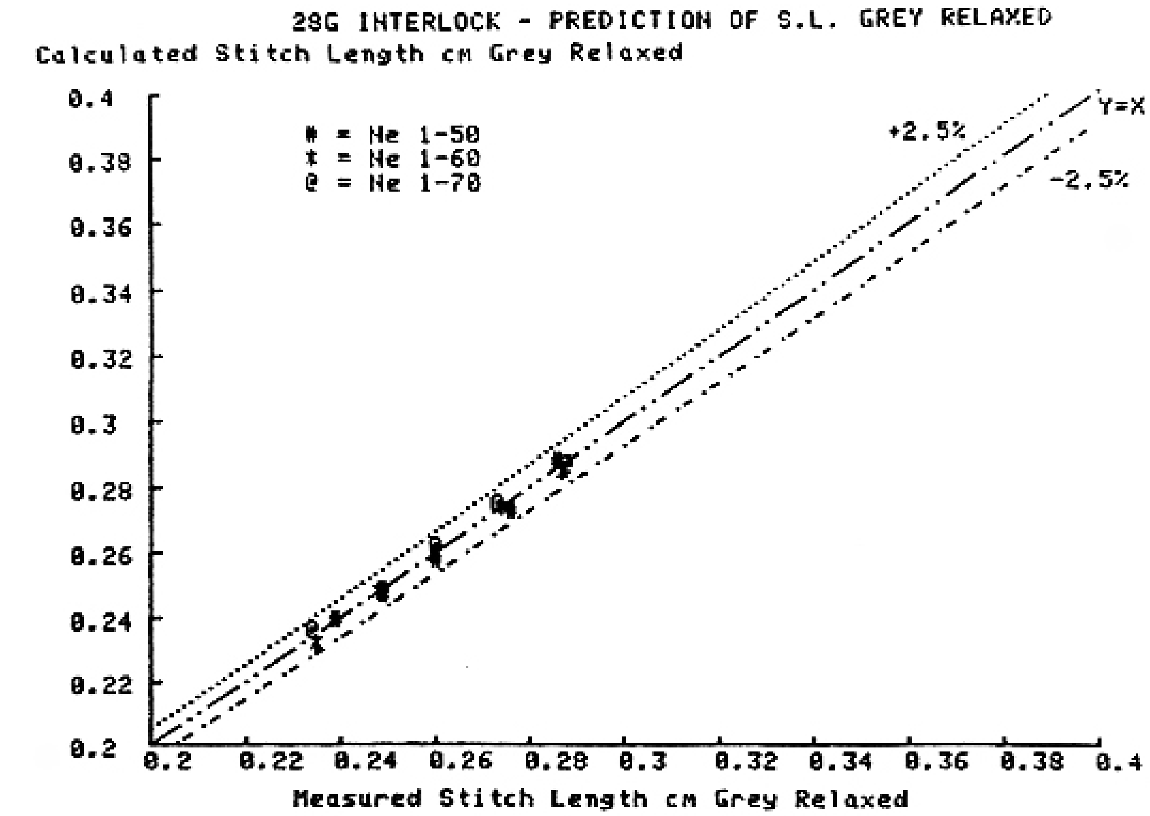
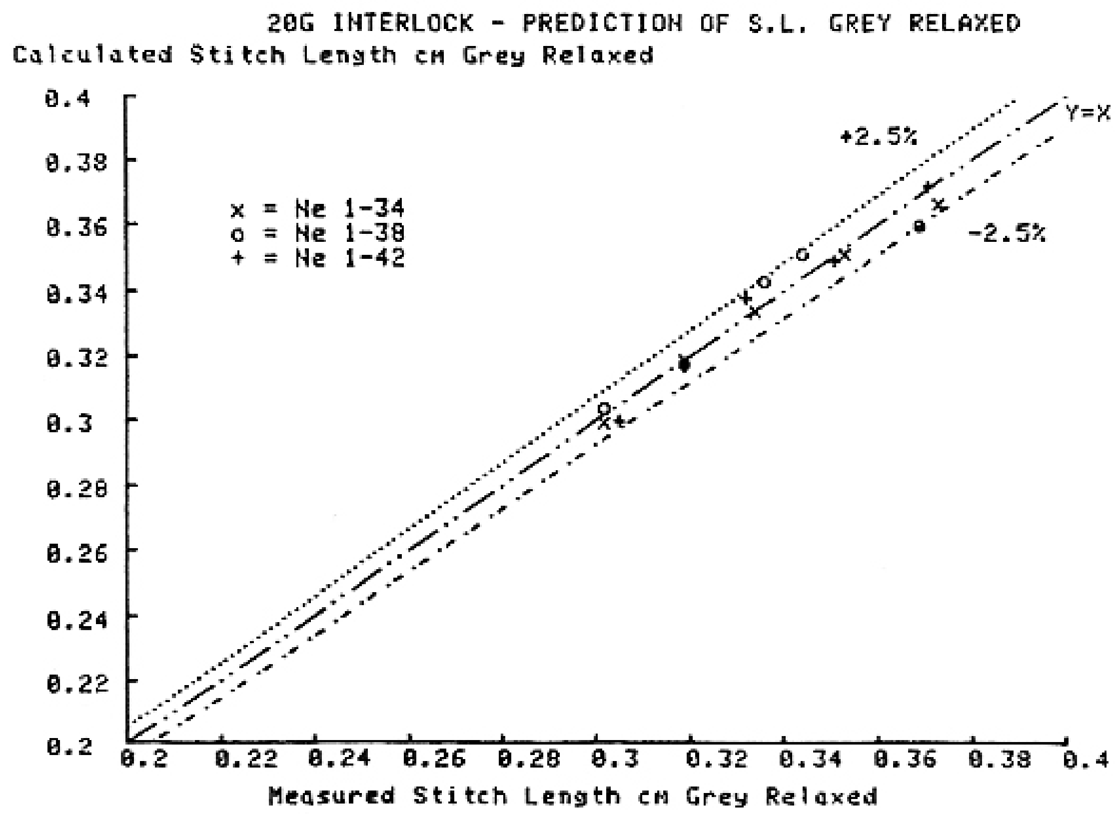

20G INTERLOCK - CHANGE IN S.L. DURING GREY RELAXATION
Stitch length cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Y=X
Calculated regression
Stitch Length cm As Knitted (Grey BW)

Figure 15

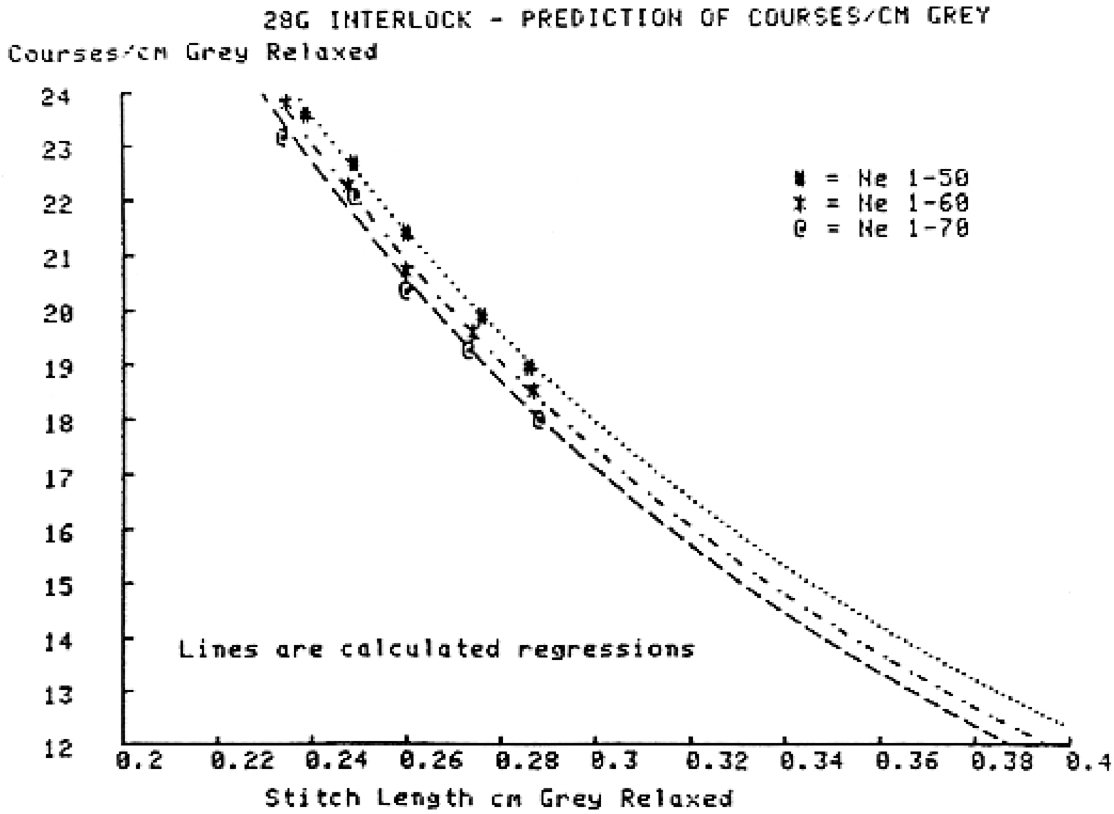


28G INTERLOCK - PREDICTION OF S.L. GREY RELAXED
Calculated Stitch Length cm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.2 0.22 0.24 0.26 0.28 0.3 0.32 0.34 0.36 0.38 0.4
Measured Stitch Length cm Grey Relaxed



20G INTERLOCK - PREDICTION OF S.L. GREY RELAXED
Calculated Stitch Length cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
-2.5%
Y=X
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.2 0.22 0.24 0.26 0.28 0.3 0.32 0.34 0.36 0.38 0.4
Measured Stitch Length cm Grey Relaxed

Figure 16


28G INTERLOCK - PREDICTION OF COURSES/CM GREY
Courses/cm Grey Relaxed
24
23
22
21
20
19
18
17
16
15
14
13
12
* = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

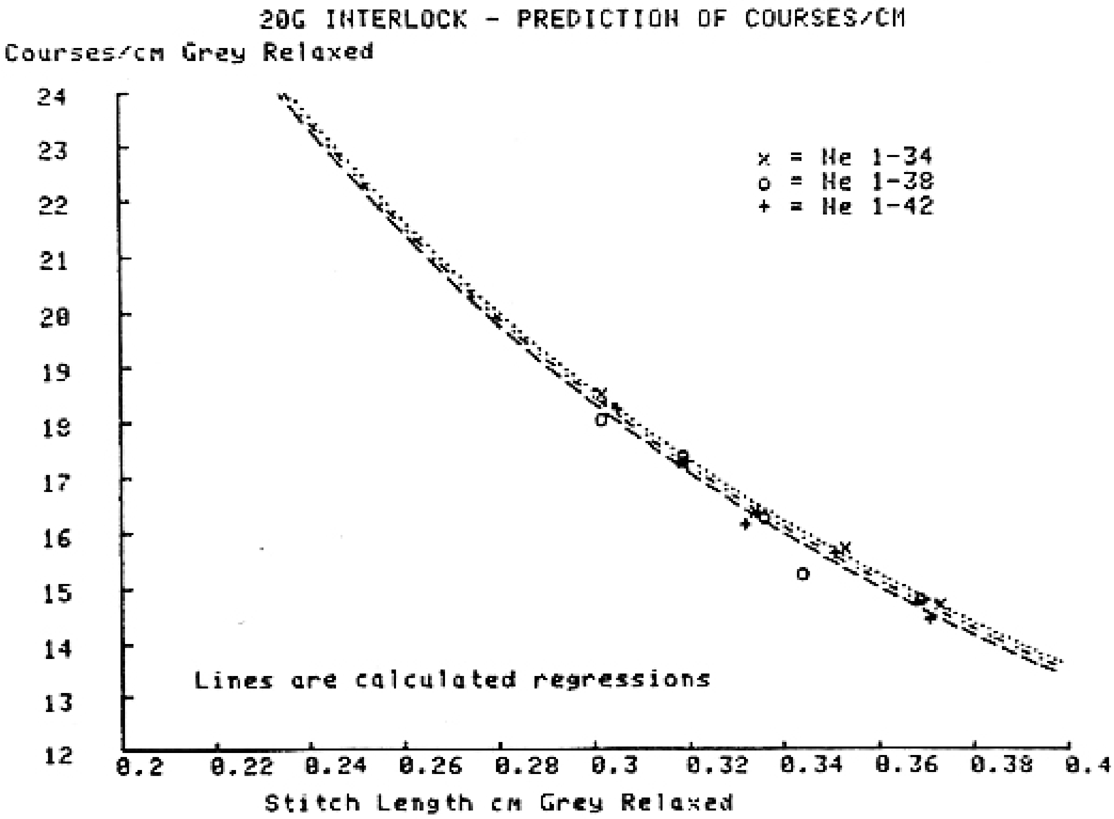
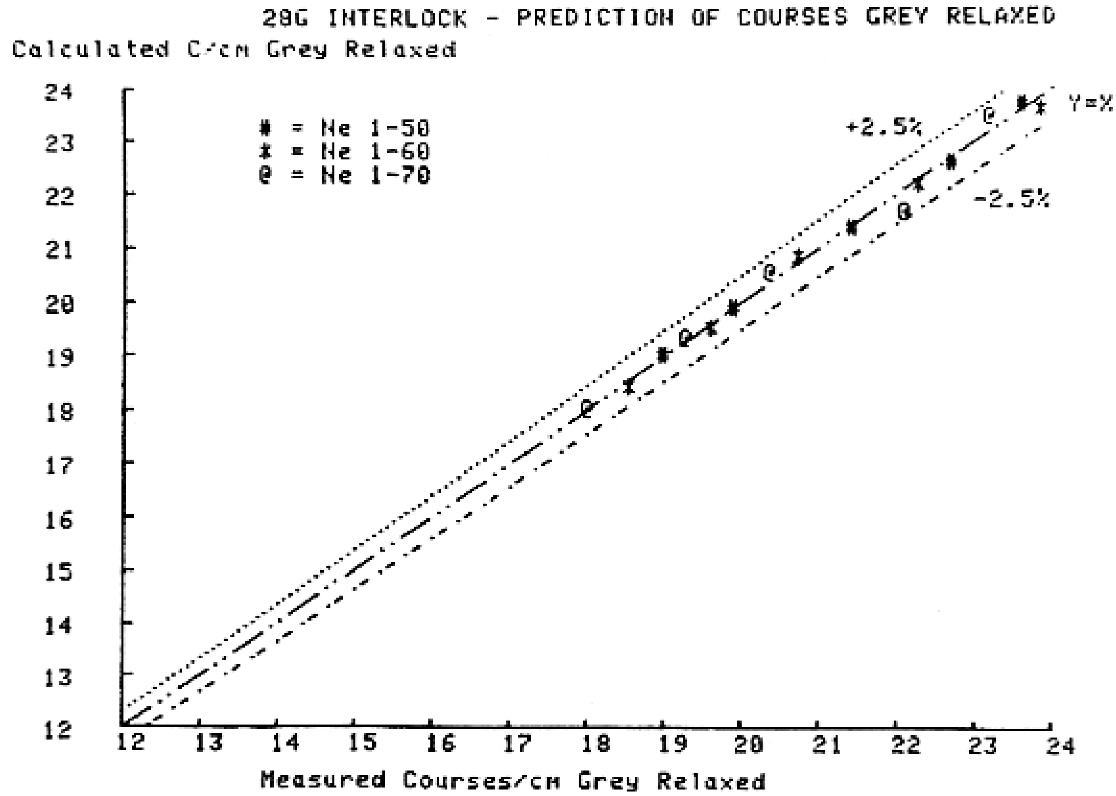

20G INTERLOCK - PREDICTION OF COURSES/CM
Courses/cm Grey Relaxed
24
23
22
21
20
19
18
17
16
15
14
13
12
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

Figure 17


20G INTERLOCK - PREDICTION OF COURSES GREY RELAXED
Calculated C/cm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
24
23
22
21
20
19
18
17
16
15
14
13
12
12 13 14 15 16 17 18 19 20 21 22 23 24
Measured Courses/cm Grey Relaxed

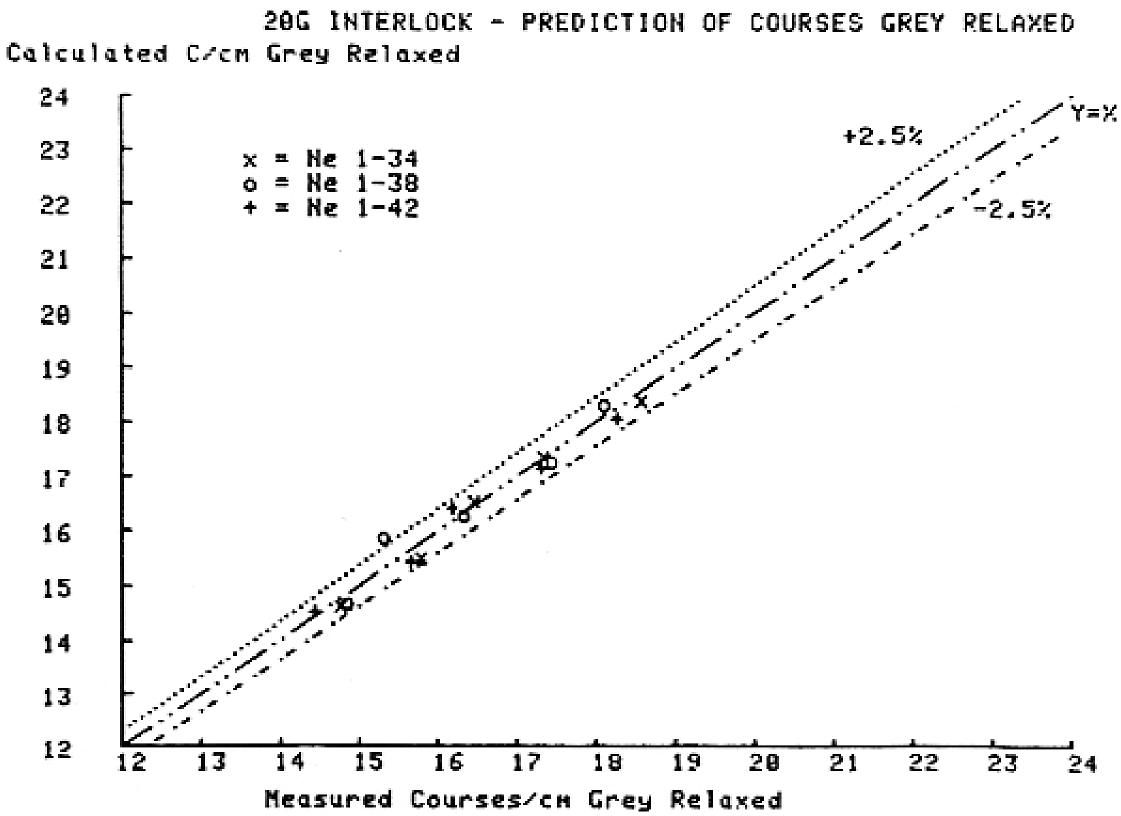
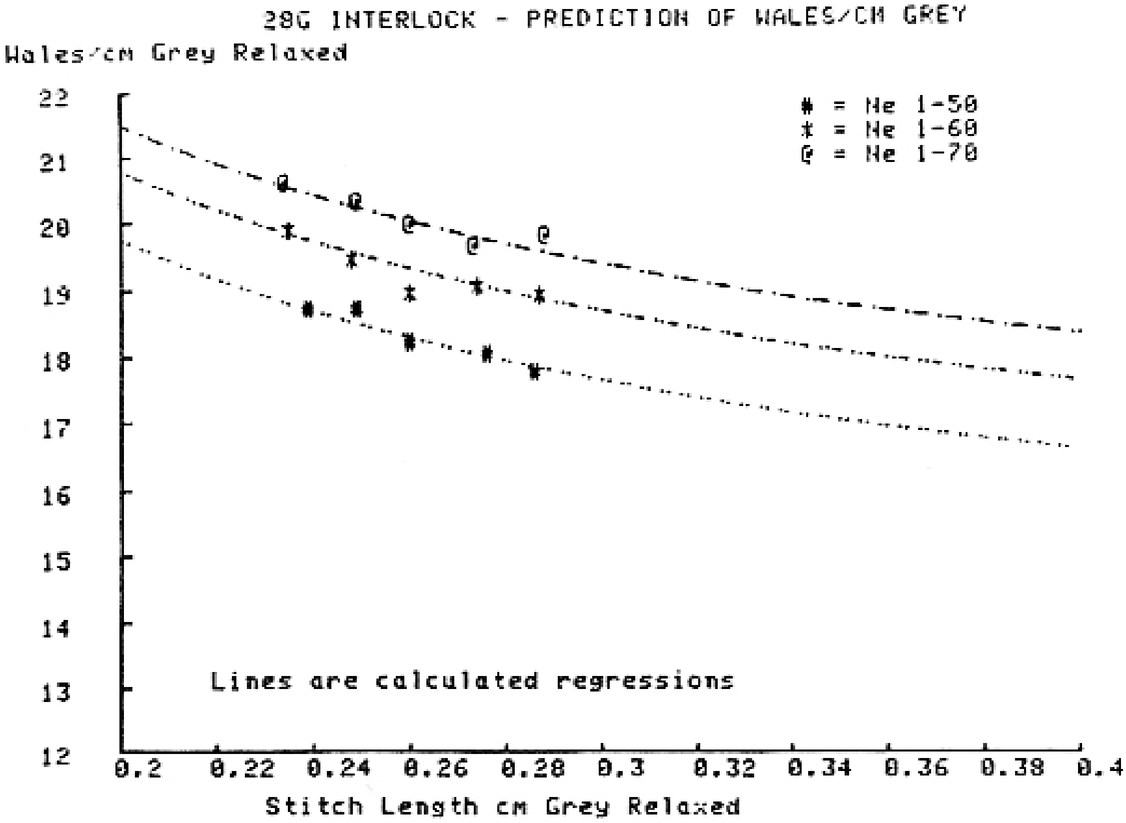

20G INTERLOCK - PREDICTION OF COURSES GREY RELAXED
Calculated C/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
-2.5%
Y=X
24
23
22
21
20
19
18
17
16
15
14
13
12
12 13 14 15 16 17 18 19 20 21 22 23 24
Measured Courses/cm Grey Relaxed

Figure 18


28G INTERLOCK - PREDICTION OF WALES/CM GREY
Wales/cm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
12
13
14
15
16
17
18
19
20
21
22
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

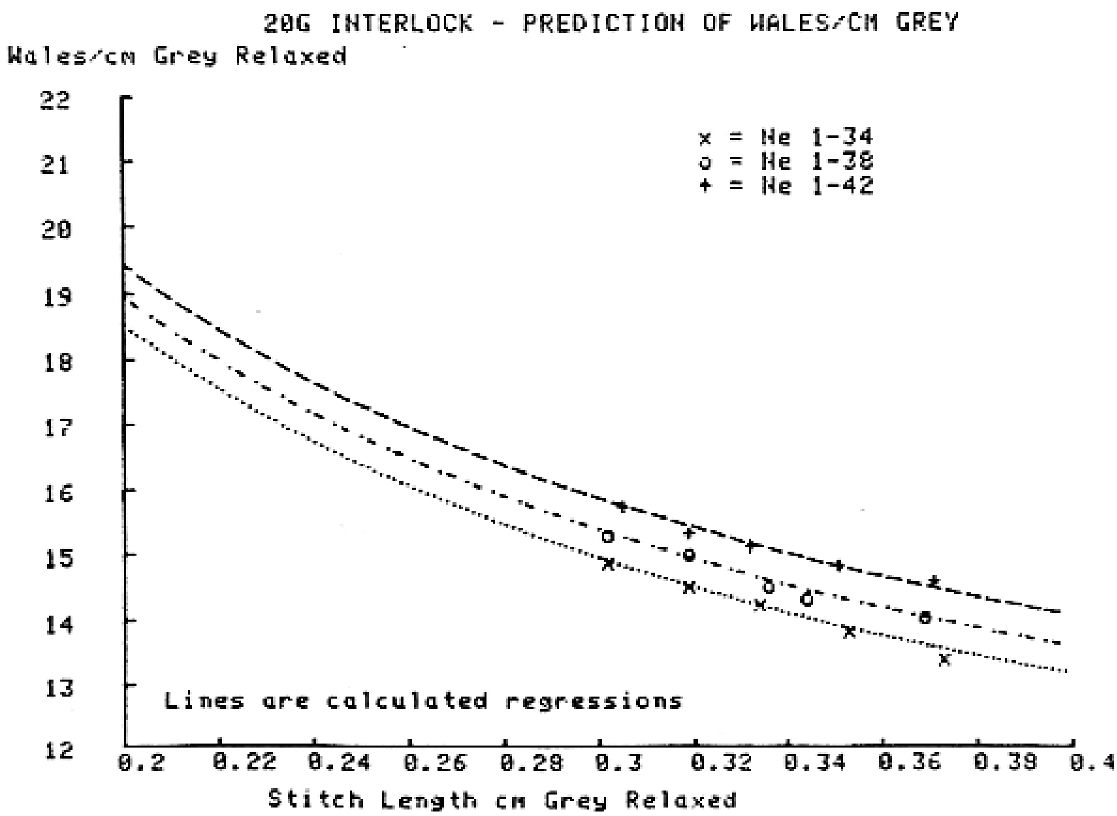
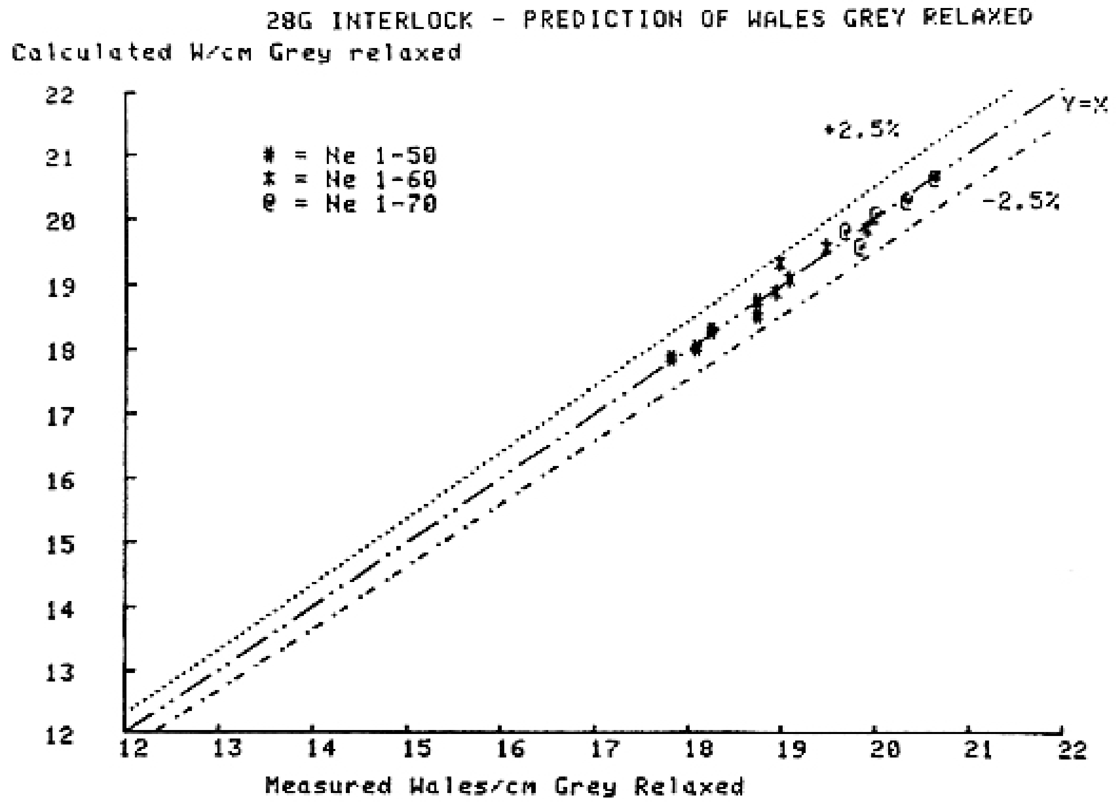

20G INTERLOCK - PREDICTION OF WALES/CM GREY
Wales/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Lines are calculated regressions
12
13
14
15
16
17
18
19
20
21
22
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

Figure 19


28G INTERLOCK - PREDICTION OF WALES GREY RELAXED
Calculated W/cm Grey relaxed
Measured Wales/cm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
12
13
14
15
16
17
18
19
20
21
22

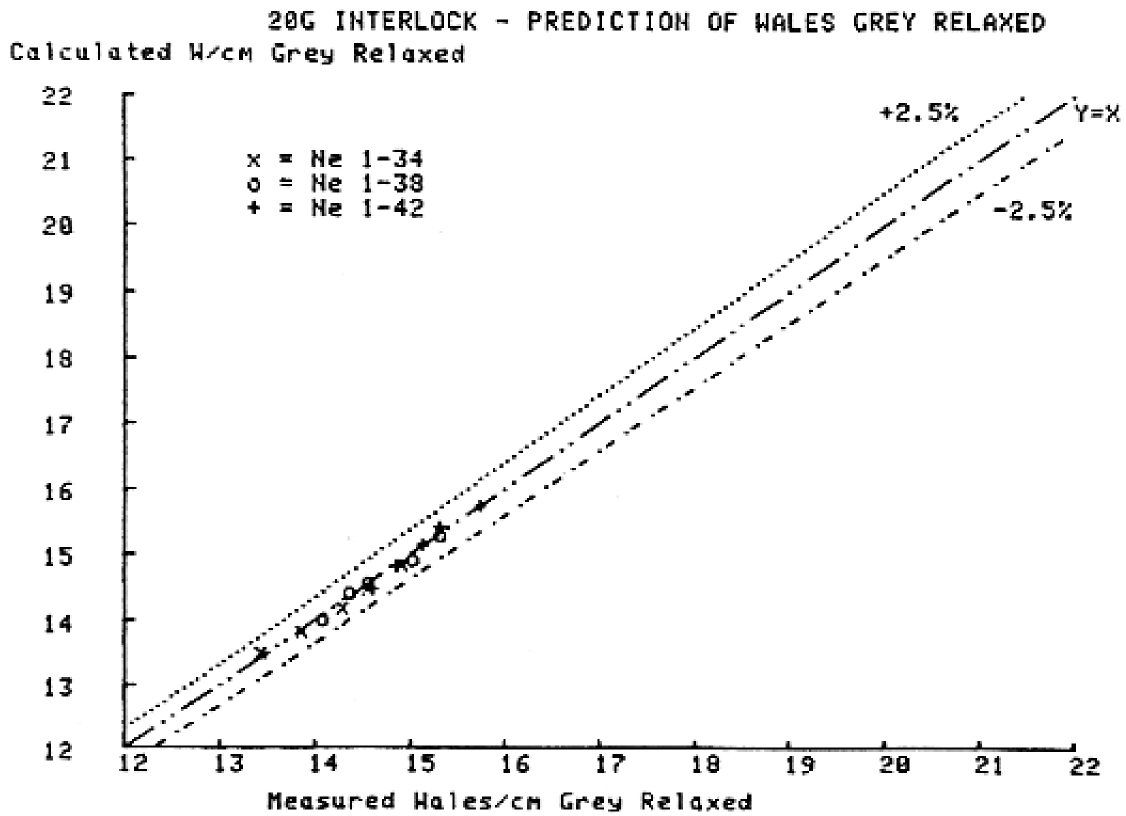
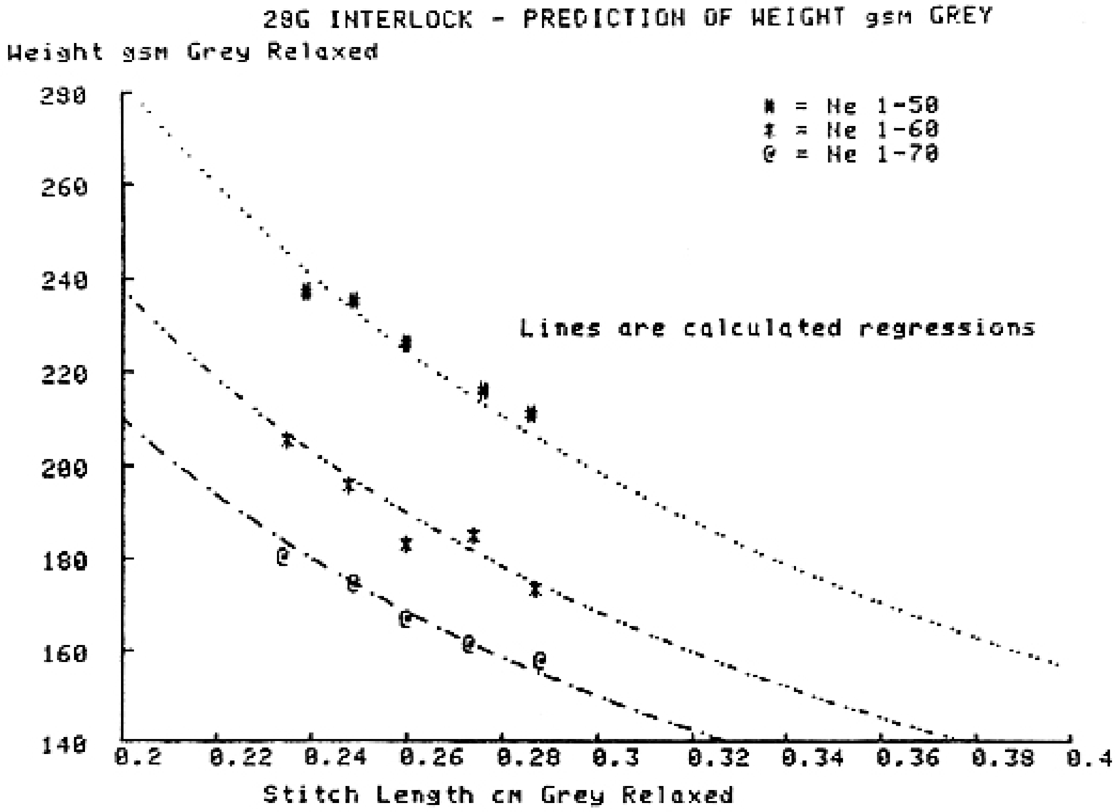

20G INTERLOCK - PREDICTION OF WALES GREY RELAXED
Calculated W/cm Grey Relaxed
Measured Wales/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
-2.5%
Y=X
12
13
14
15
16
17
18
19
20
21
22

Figure 20


28G INTERLOCK - PREDICTION OF WEIGHT gsm GREY
Weight gsm Grey Relaxed
280
260
240
220
200
180
160
140
* = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

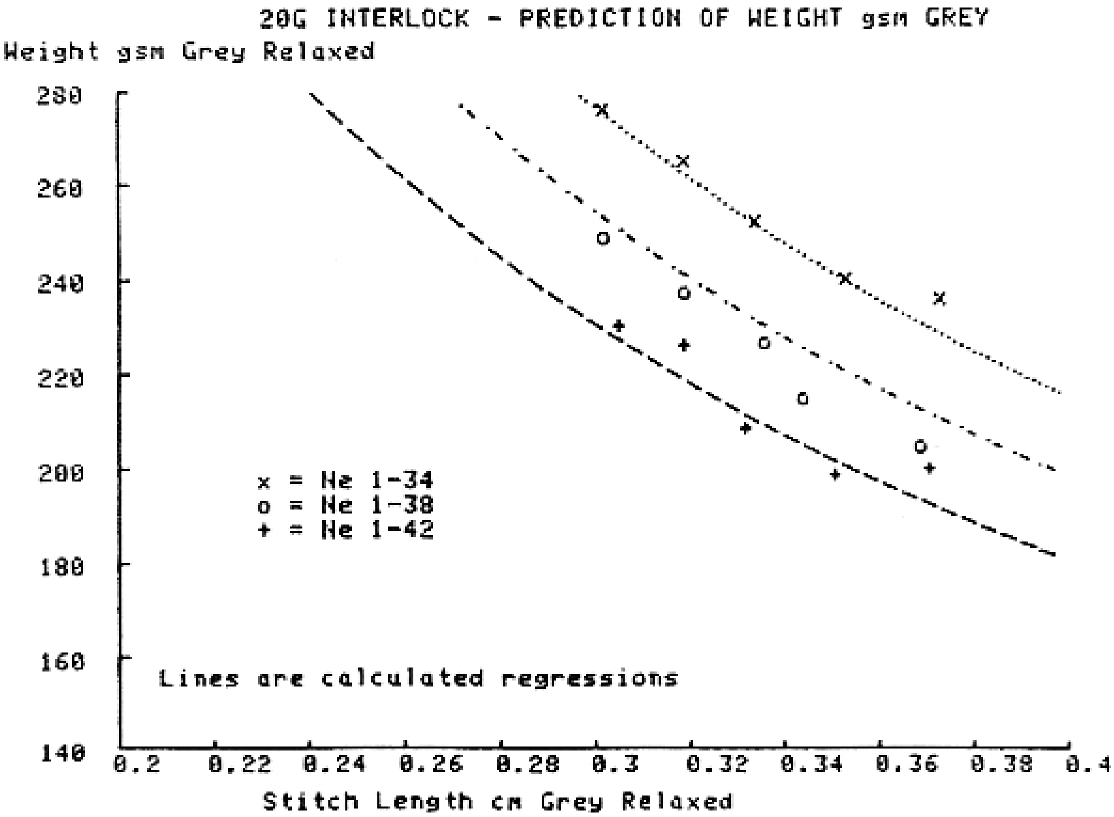
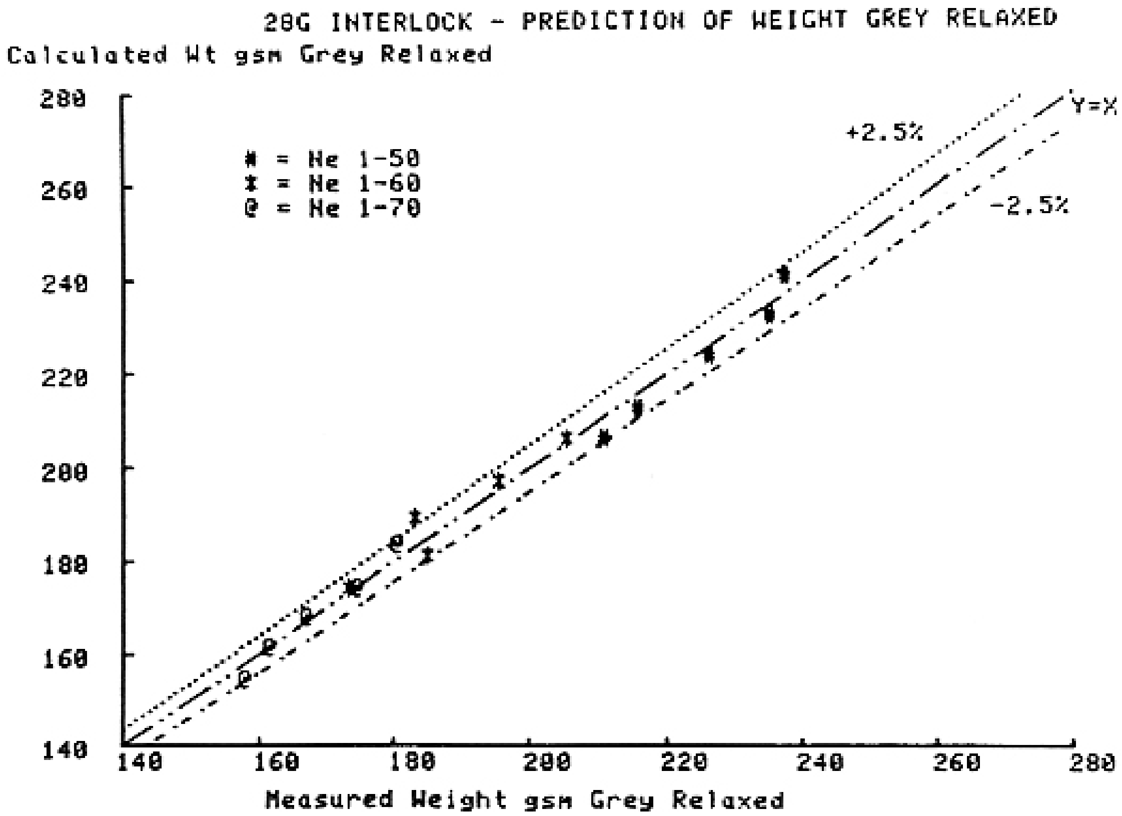
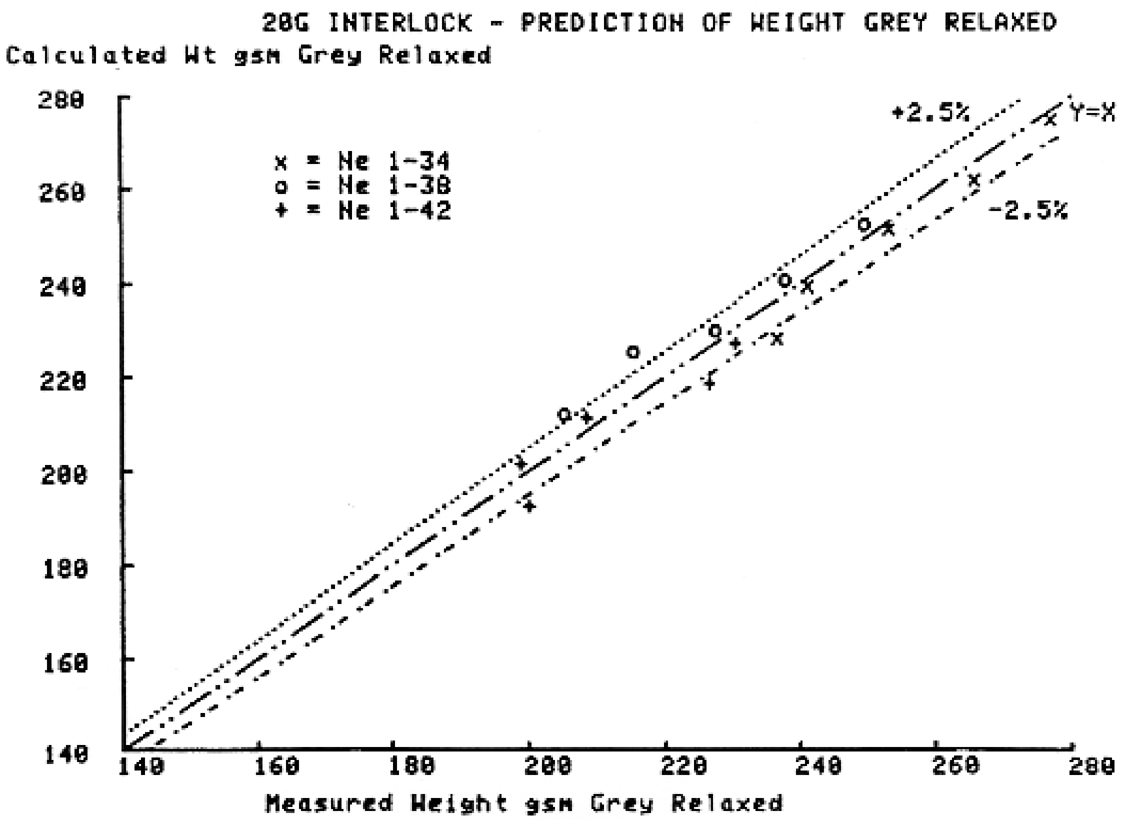

20G INTERLOCK - PREDICTION OF WEIGHT gsm GREY
Weight gsm Grey Relaxed
280
260
240
220
200
180
160
140
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

Figure 21

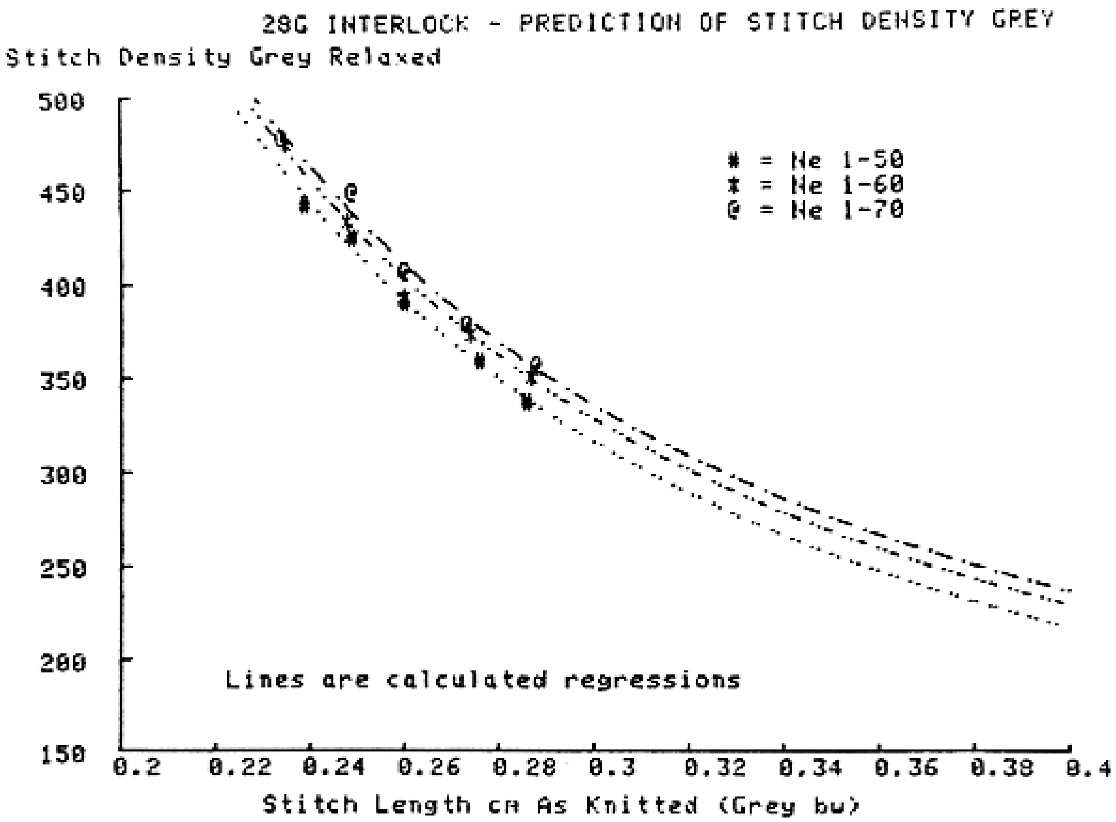


28G INTERLOCK - PREDICTION OF WEIGHT GREY RELAXED
Calculated Wt gsm Grey Relaxed
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
140
160
180
200
220
240
260
280
Measured Weight gsm Grey Relaxed



28G INTERLOCK - PREDICTION OF WEIGHT GREY RELAXED
Calculated Wt gsm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
-2.5%
Y=X
140
160
180
200
220
240
260
280
Measured Weight gsm Grey Relaxed

Figure 22


28G INTERLOCK - PREDICTION OF STITCH DENSITY GREY
Stitch Density Grey Relaxed
500
450
400
350
300
250
200
150
= Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm As Knitted (Grey bw)

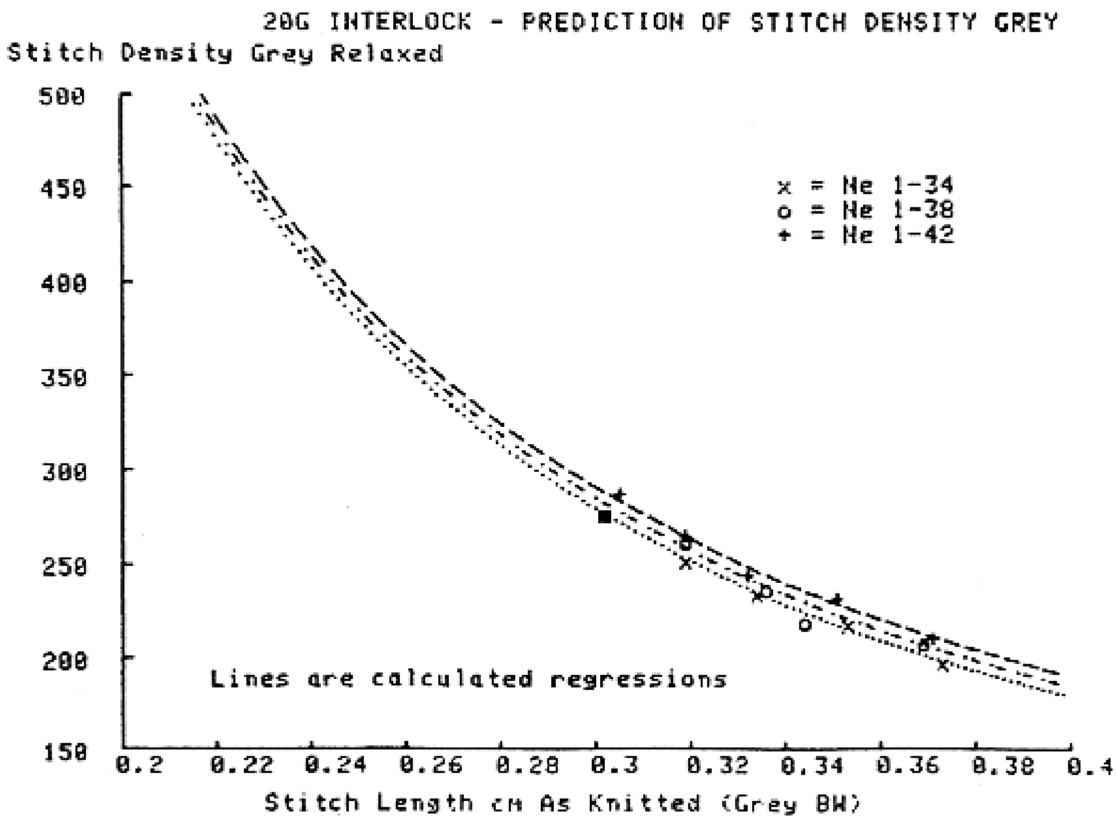
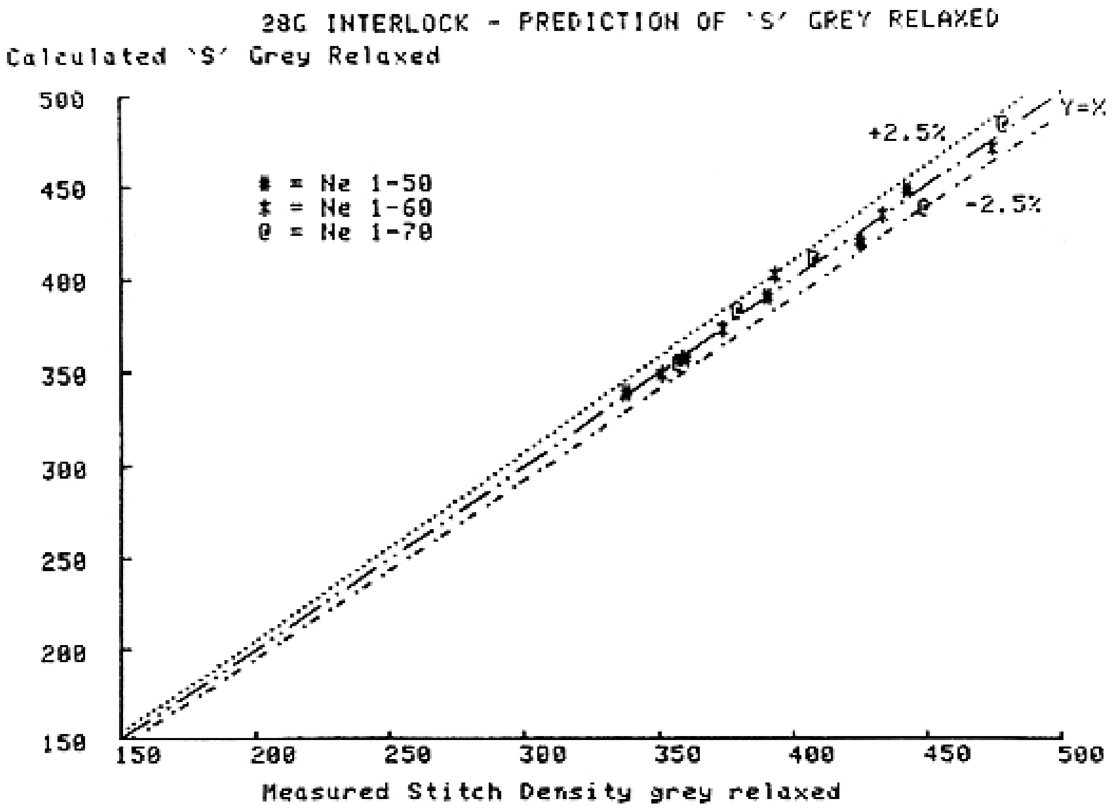

20G INTERLOCK - PREDICTION OF STITCH DENSITY GREY
Stitch Density Grey Relaxed
500
450
400
350
300
250
200
150
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm As Knitted (Grey BW)

Figure 23


28G INTERLOCK - PREDICTION OF 'S' GREY RELAXED
Calculated 'S' Grey Relaxed
500
450
400
350
300
250
200
150
= Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
150
200
250
300
350
400
450
500
Measured Stitch Density grey relaxed

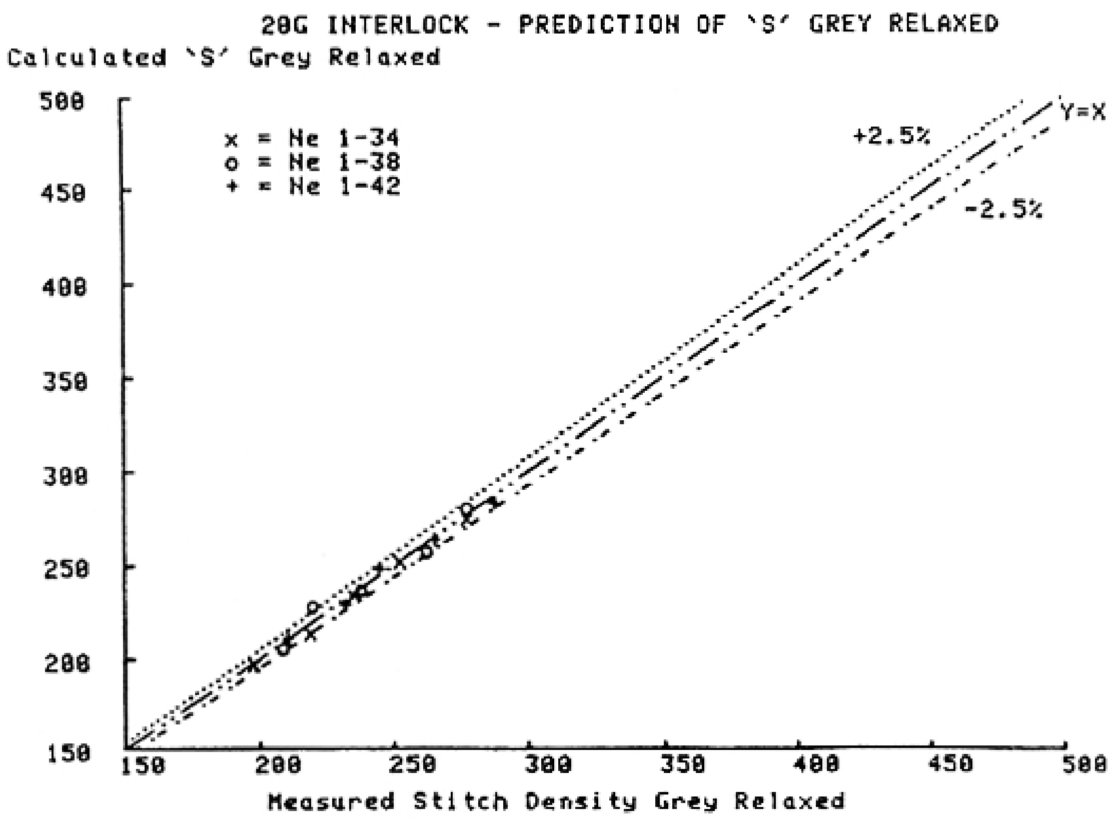
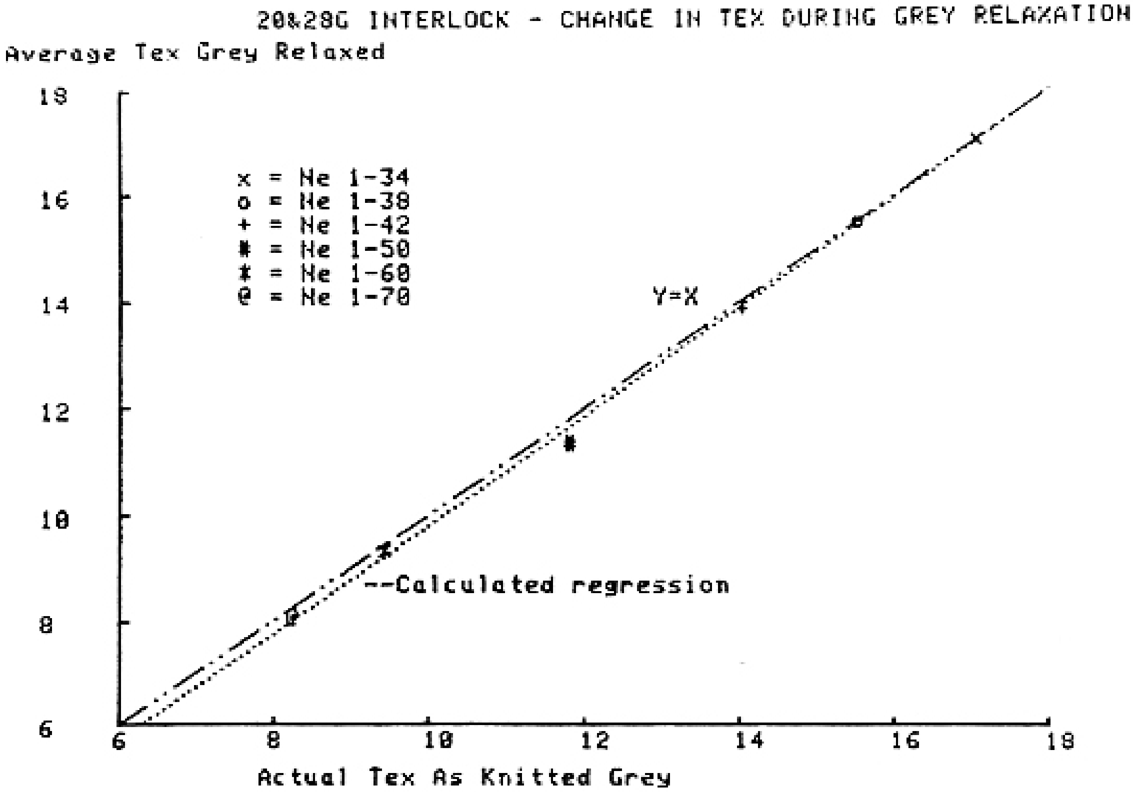

20G INTERLOCK - PREDICTION OF 'S' GREY RELAXED
Calculated 'S' Grey Relaxed
500
450
400
350
300
250
200
150
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
+2.5%
-2.5%
Y=X
150
200
250
300
350
400
450
500
Measured Stitch Density Grey Relaxed

Figure 24


20&28G INTERLOCK - CHANGE IN TEX DURING GREY RELAXATION
Average Tex Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Y=X
--Calculated regression
6
8
10
12
14
16
18
Actual Tex As Knitted Grey

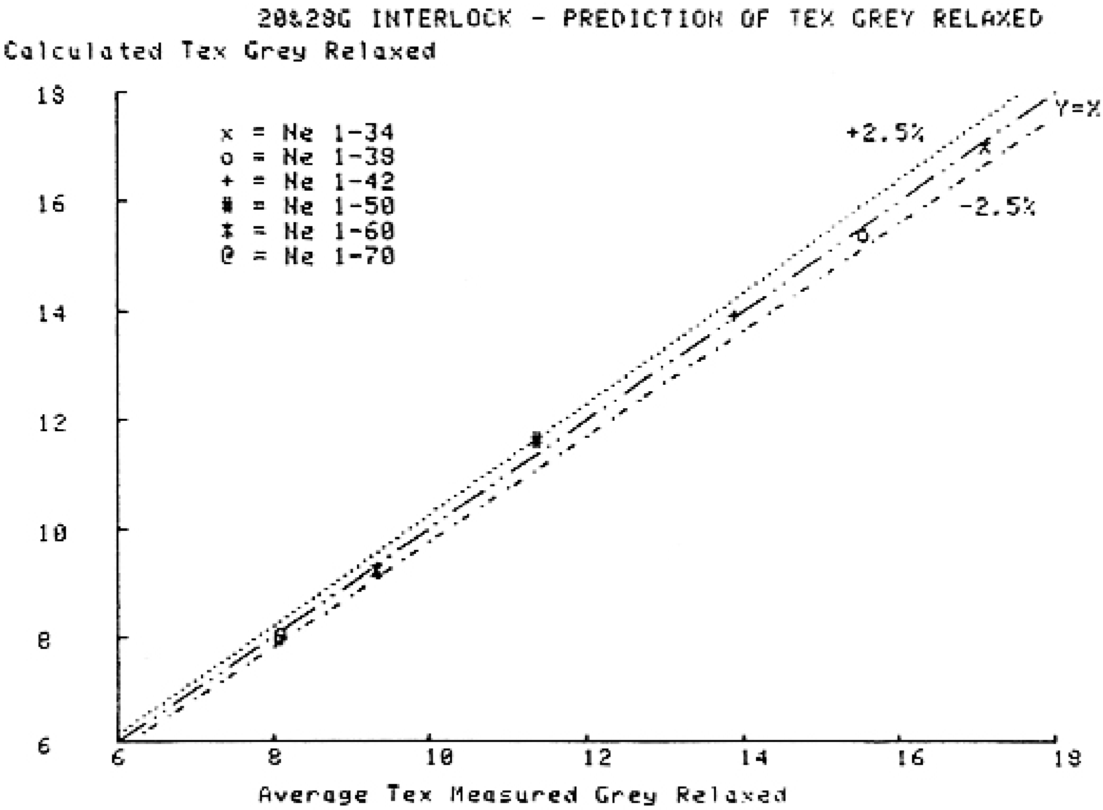
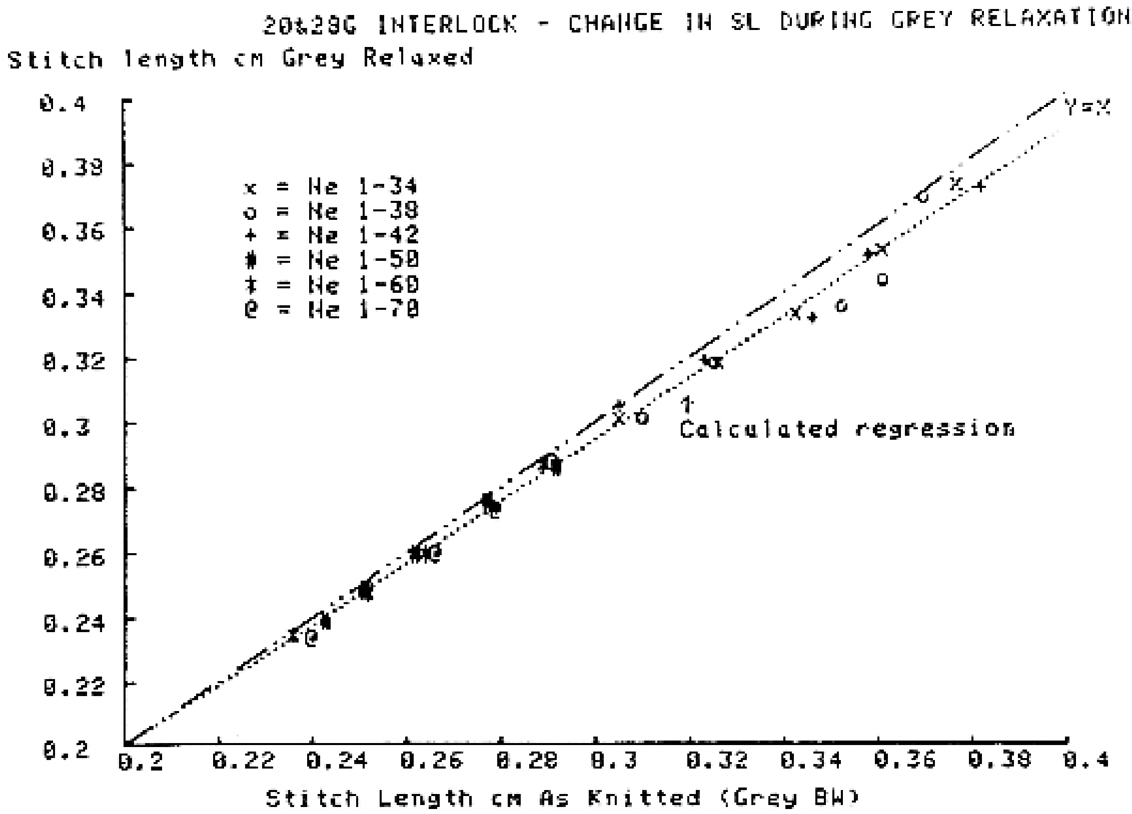

20&28G INTERLOCK - PREDICTION OF TEX GREY RELAXED
Calculated Tex Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
Y=X
-2.5%
6
8
10
12
14
16
18
Average Tex Measured Grey Relaxed

Figure 25


20&28G INTERLOCK - CHANGE IN SL DURING GREY RELAXATION
Stitch length cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
Y=X
Calculated regression
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm As Knitted (Grey BW)

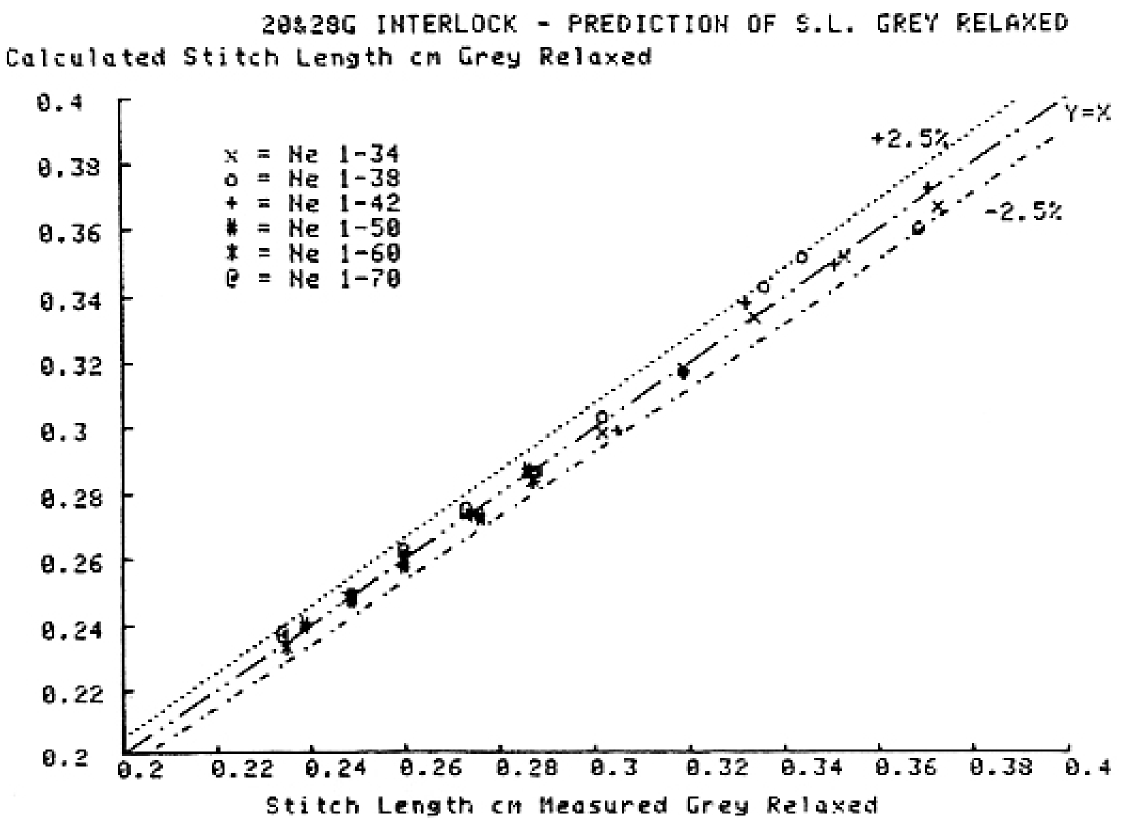
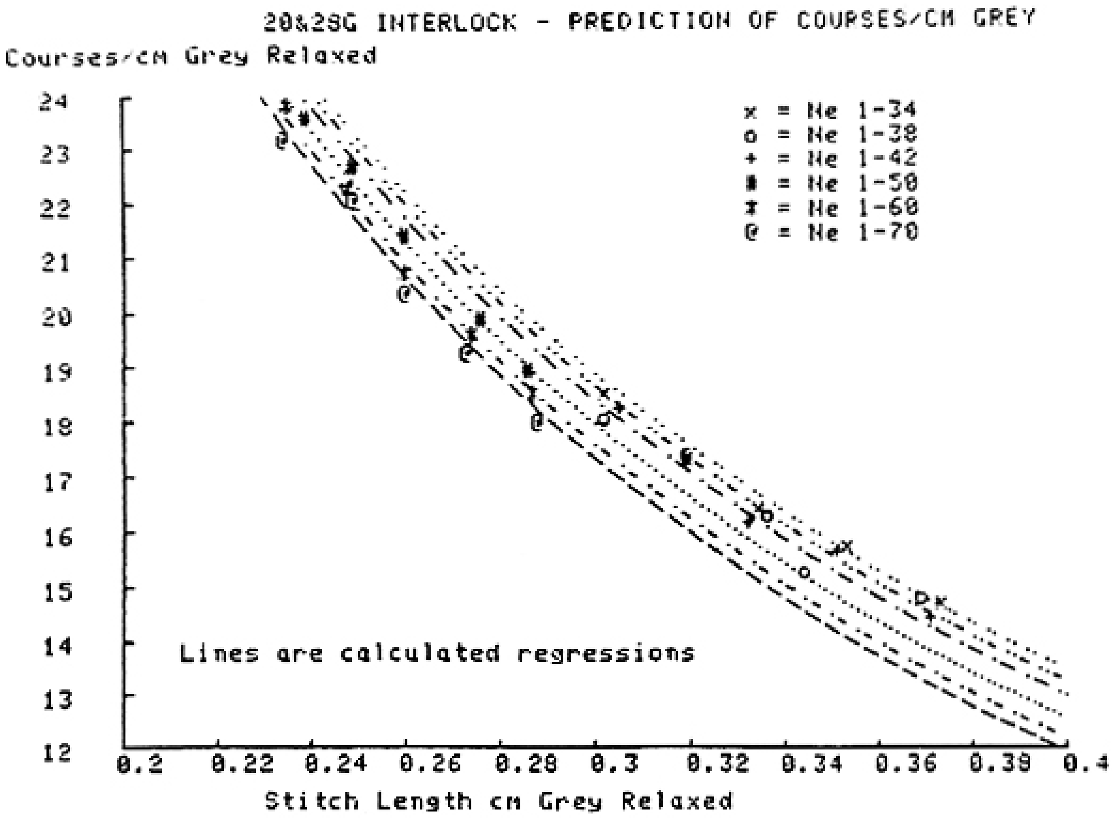
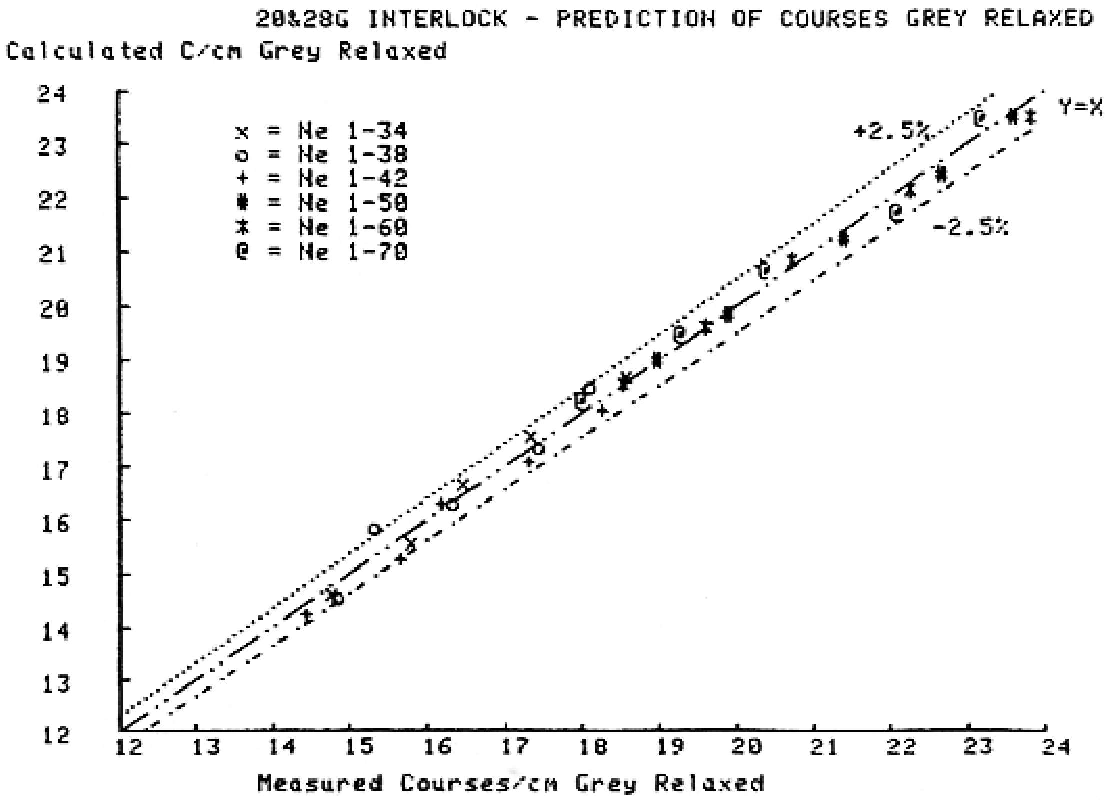

20&28G INTERLOCK - PREDICTION OF S.L. GREY RELAXED
Calculated Stitch Length cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
Y=X
+2.5%
-2.5%
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Measured Grey Relaxed

Figure 26

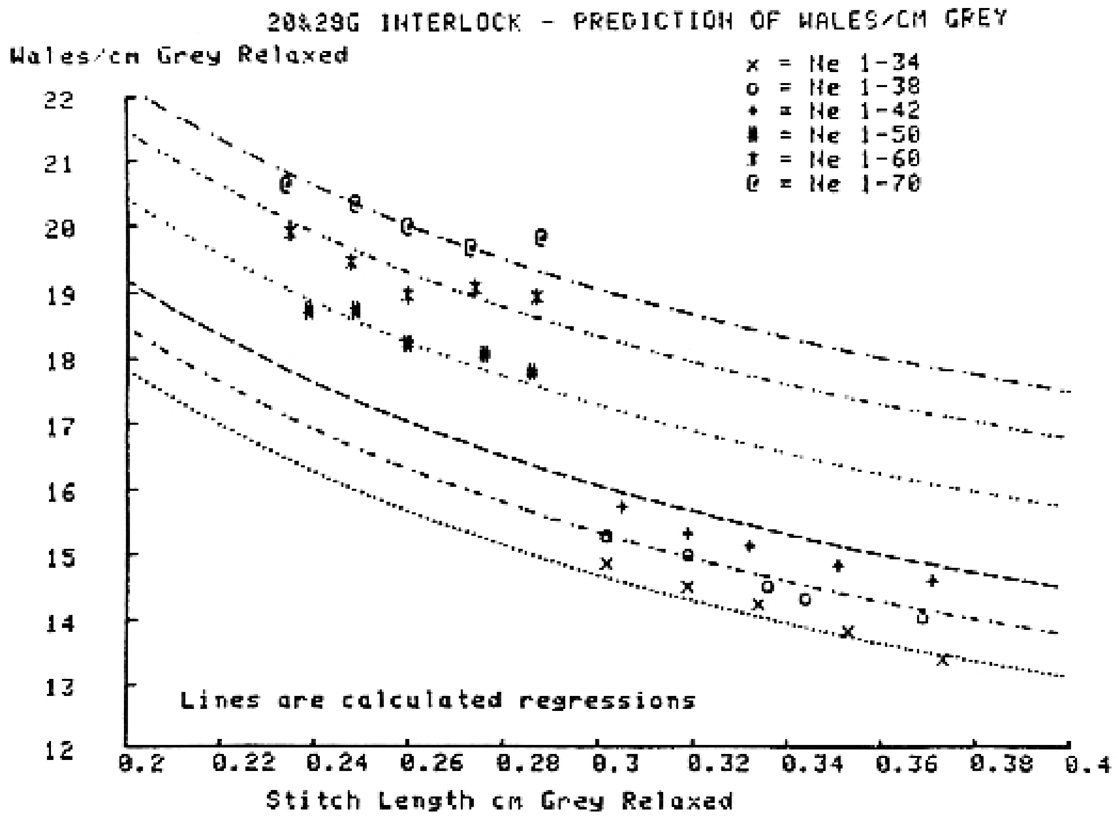


20&28G INTERLOCK - PREDICTION OF COURSES/CM GREY
Courses/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
Stitch Length cm Grey Relaxed



20&28G INTERLOCK - PREDICTION OF COURSES GREY RELAXED
Calculated C/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
Y=X
-2.5%
Measured Courses/cm Grey Relaxed

Figure 27


20&28G INTERLOCK - PREDICTION OF WALES/CM GREY
Wales/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
Stitch Length cm Grey Relaxed

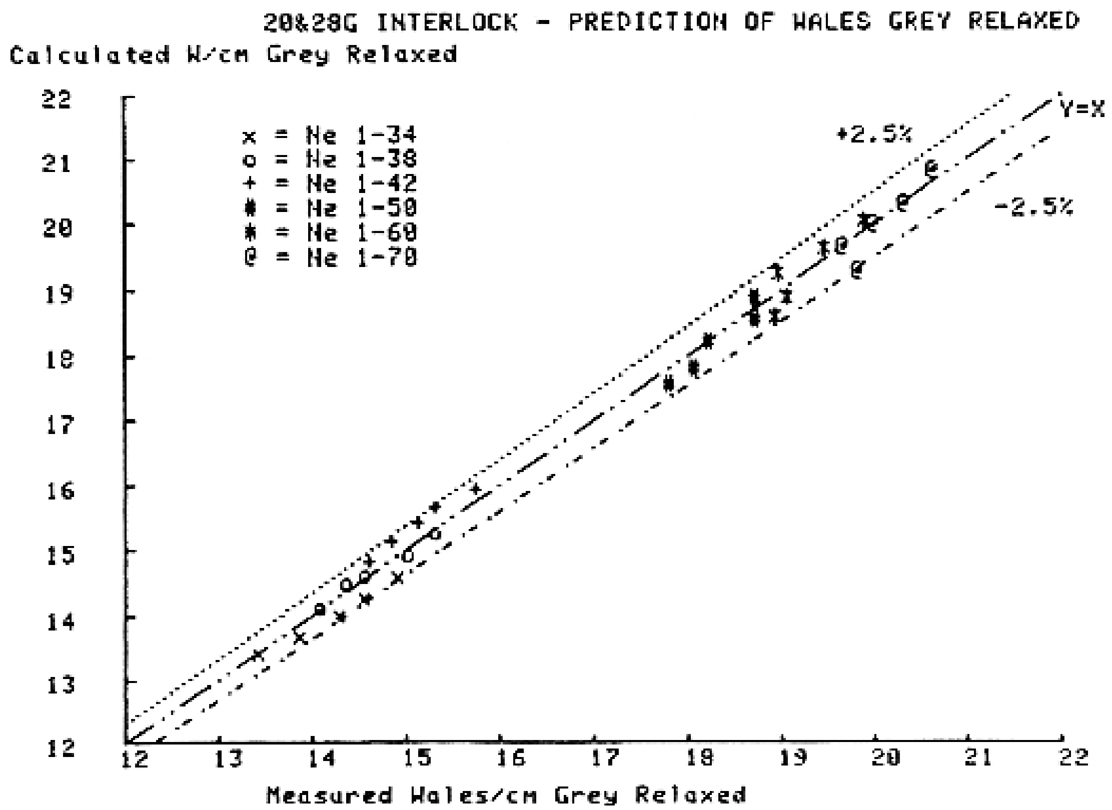
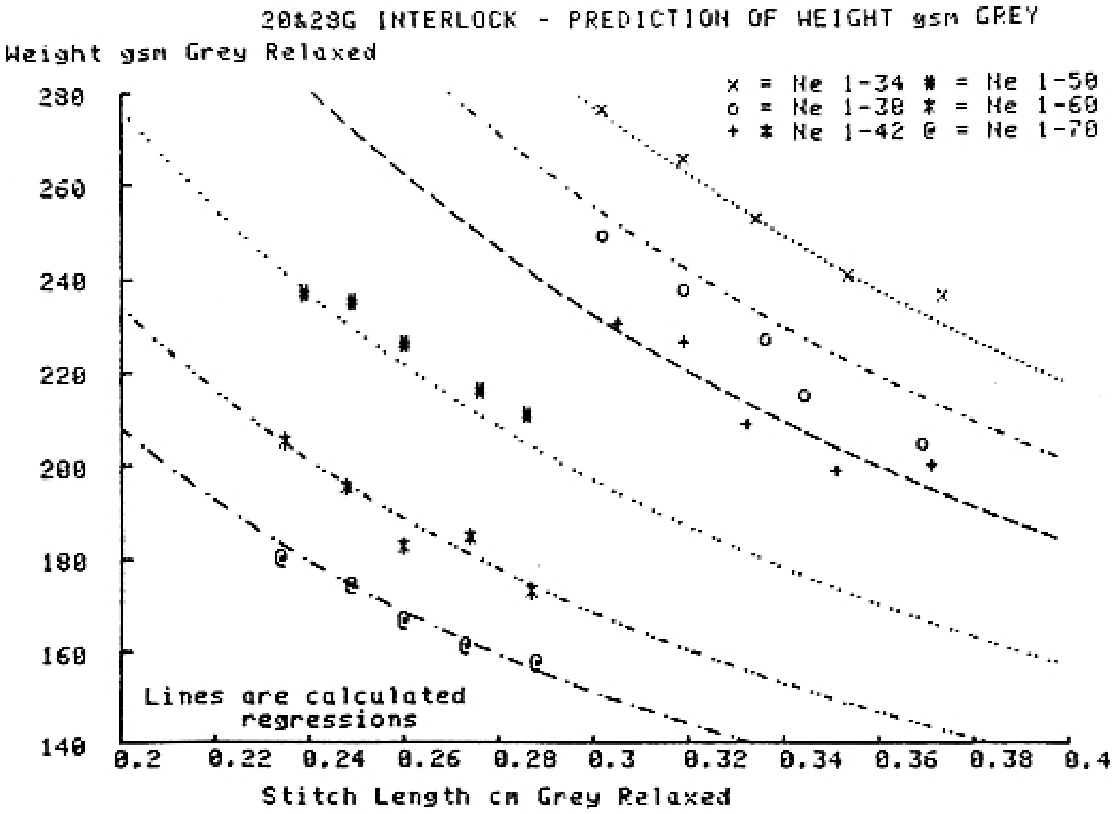

20&28G INTERLOCK - PREDICTION OF WALES GREY RELAXED
Calculated W/cm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
Y=X
+2.5%
-2.5%
Measured Wales/cm Grey Relaxed

Figure 28


20&28G INTERLOCK - PREDICTION OF WEIGHT gsm GREY
Weight gsm Grey Relaxed
x = Ne 1-34 # = Ne 1-50
o = Ne 1-38 * = Ne 1-60
+ = Ne 1-42 @ = Ne 1-70
Lines are calculated regressions
280
260
240
220
200
180
160
140
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm Grey Relaxed

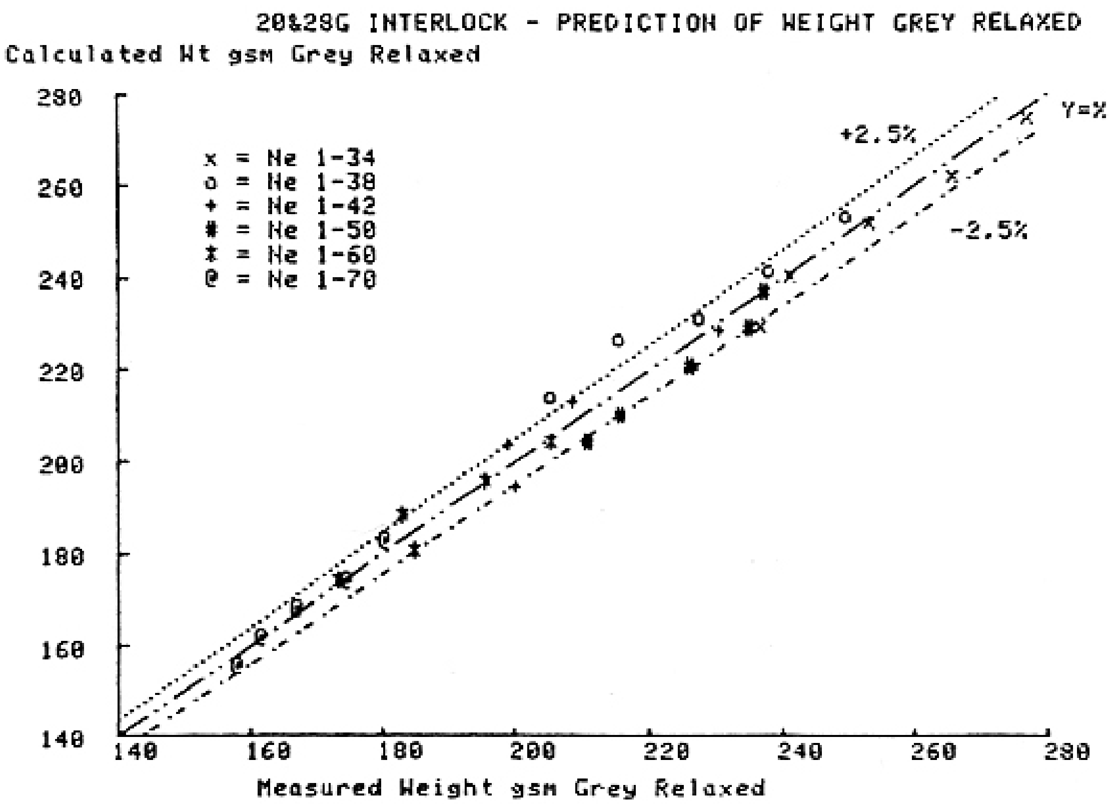
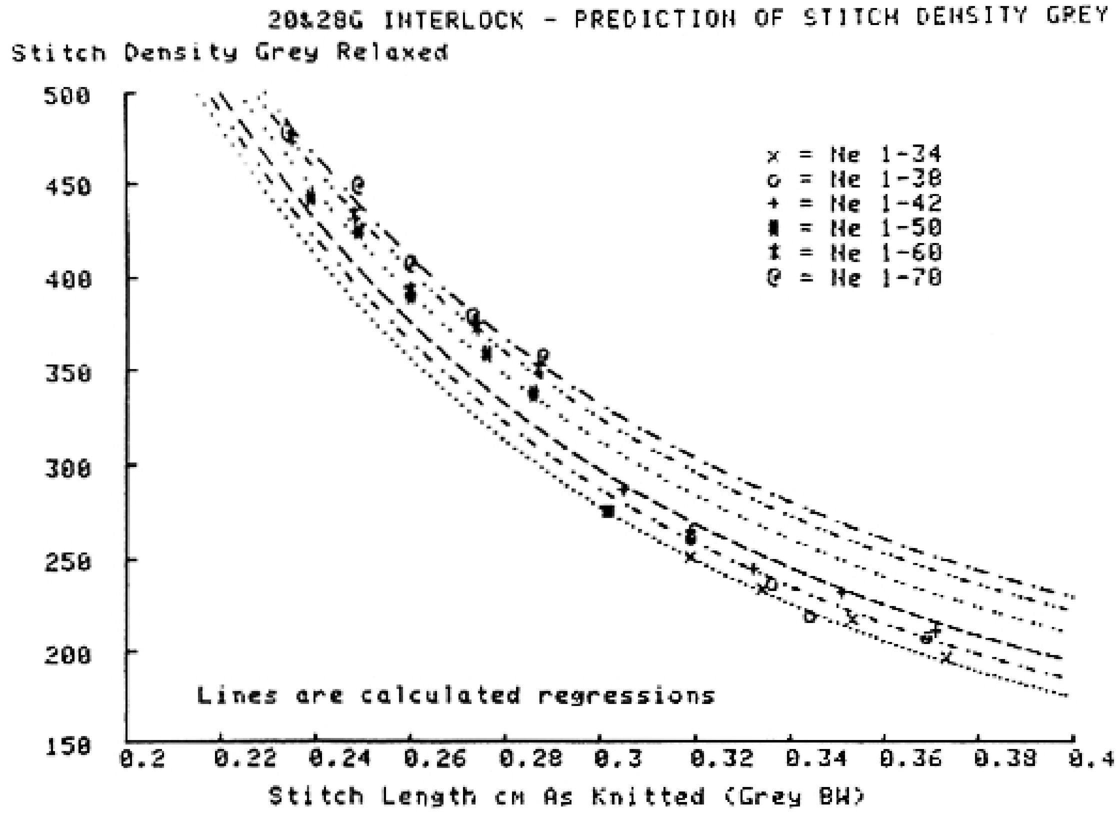

20&28G INTERLOCK - PREDICTION OF WEIGHT GREY RELAXED
Calculated Wt gsm Grey Relaxed
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
* = Ne 1-60
@ = Ne 1-70
+2.5%
Y=X
-2.5%
280
260
240
220
200
180
160
140
140
160
180
200
220
240
260
280
Measured Weight gsm Grey Relaxed

Figure 29


20&28G INTERLOCK - PREDICTION OF STITCH DENSITY GREY
Stitch Density Grey Relaxed
500
450
400
350
300
250
200
150
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
Lines are calculated regressions
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
Stitch Length cm As Knitted (Grey BW)

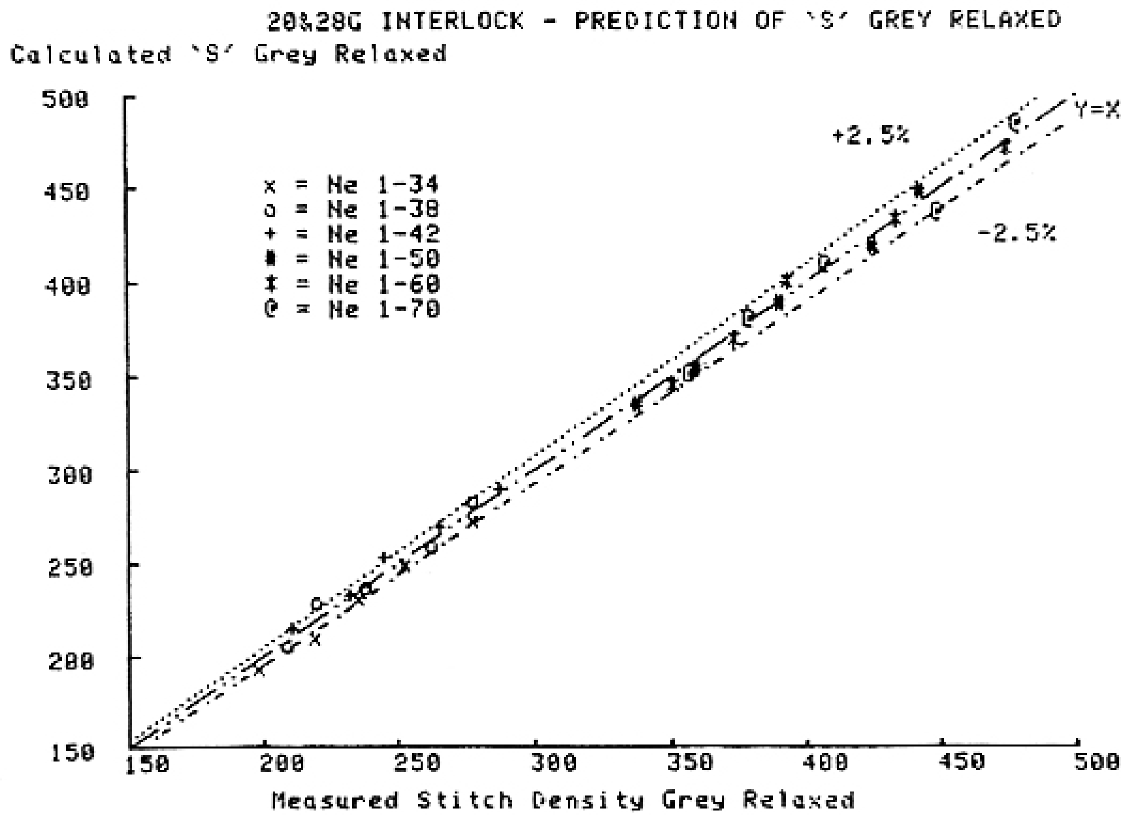

20&28G INTERLOCK - PREDICTION OF 'S' GREY RELAXED
Calculated 'S' Grey Relaxed
500
450
400
350
300
250
200
150
x = Ne 1-34
o = Ne 1-38
+ = Ne 1-42
# = Ne 1-50
‡ = Ne 1-60
@ = Ne 1-70
+2.5%
-2.5%
Y=X
150
200
250
300
350
400
450
500
Measured Stitch Density Grey Relaxed

Figure 30

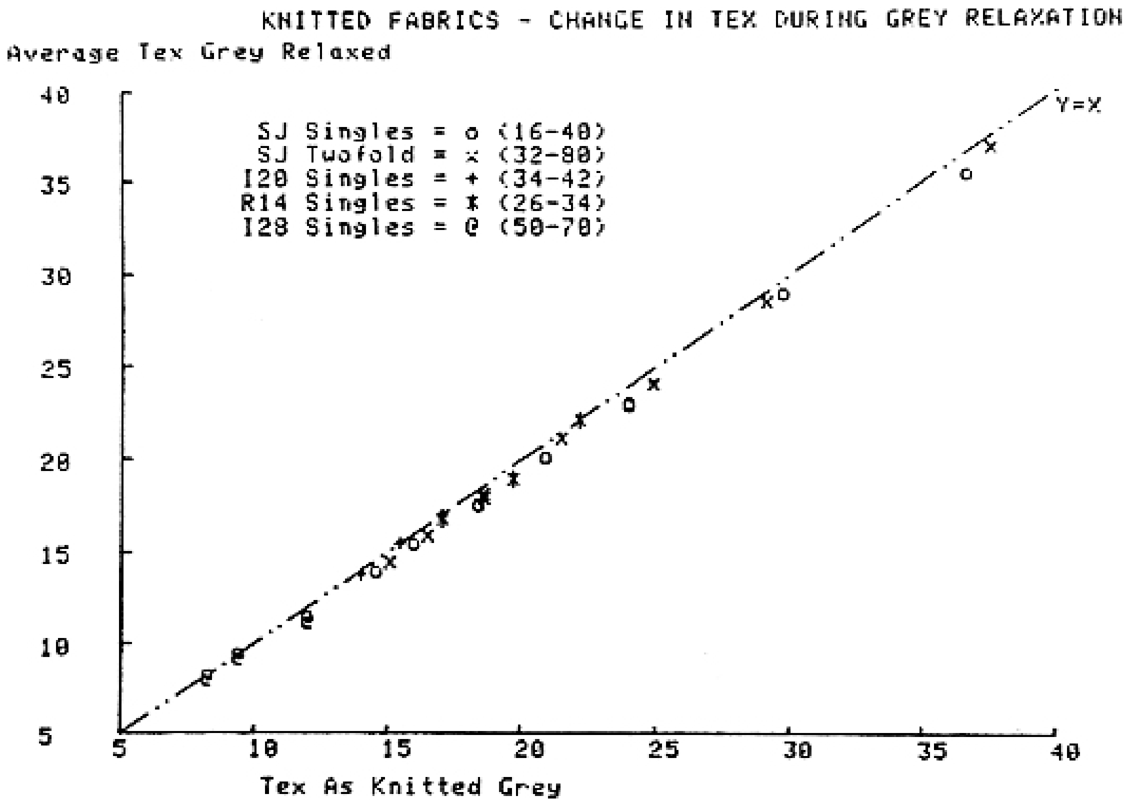


Figure 31