RESEARCH RECORD NO: 186

28 GAUGE INTERLOCK

AN ANALYSIS OF THE TEST RESULTS

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CLASSIFICATION: FABRICS/KNITTED/PROPERTIES

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INTRODUCTION

The production of a series of 28 gauge interlock fabrics, from three yarn counts and using five stitch lengths, was described in Research Record No. 162. In the same report, the properties of these fabrics were analysed and, in particular, equations were derived to describe the observed trends in course and wale spacings and fabric weight in the Reference State, in terms of the knitted structure parameters of yarn count and stitch length.

The processing of two identical sets of these fabrics was described in Research Record No. 175. One set was given a peroxide bleach followed by dyeing with Procion Blue H-EGN (2% o.w.f.); the other subjected to a two-stage bleach with hypochlorite followed by peroxide and treated with a fluorescent whitener.

Both sets of fabrics were processed in a Bibby deep-draught winch. In the analysis which follows, the first set is designated WD (winch dyed) and the other set WB (winch bleached).

TEST DATA

Tables I and II show the test results obtained for the dyed and bleached fabrics respectively.

From these figures, certain average values have been calculated, these being:-

average yarn tex (across stitch lengths)
average stitch length (across yarns)

in both cases after relaxation. The average stitch length in the grey, as knitted, state has also been calculated.

These values are given in Table III.

The grey (as knitted) yarn count figures given in this table were obtained by testing yarn packages prior to the knitting.

FINISHING TARGETS

A system for calculating approximate finishing targets, which has since come to be known as the F (for finish) factor method, was suggested in Research Record No. 162 and further outlined in Research Record No. 175.

The method depends on the assumption that related fabric structures will respond in the same way, in terms of changes in relaxed courses and wales, when processed by the same or similar routes. The ratio of finished-to-grey courses or wales, in the relaxed state, is then referred to as the appropriate "F-factor".

From earlier studies on 20 gauge interlock, F-factors for winch processing were derived, and calculated as 0.91 for course spacing, 1.0 for wale spacing. These were then used to calculate finishing targets to achieve residual shrinkages of 10% in both directions (later modified to 15% in the width direction because of processing difficulties.

The values of course and wale spacings predicted by this method, together with the observed values after winch dyeing and winch bleaching, are given in Table IV. Quite clearly the predicted values were only approximations with an average discrepancy between predicted and observed values of about two to three per cent. Nevertheless they formed useful guidelines when no other guideline was available, and their usefulness can be judged by reference to the actual levels of residual shrinkage which were attained. In the width direction in particular, the target level of 15% was achieved quite consistently, but with these lightweight fabrics the target length shrinkage of 10% was quite impossible to attain with the machinery available.

ANALYSIS OF THE REFERENCE STATE DATA

The analysis of the structural data, obtained on the fabrics in the reference state, was carried out in a similar manner to that described for the grey fabrics in Research Record No. 162, with one important difference. Recent work has indicated that stitch length can be regarded as independent of yarn count for a given series of fabrics when knitting machine settings remain unaltered, and that stitch length changes during processing can also be regarded as independent of yarn count. This means that stitch length data can be averaged across yarn

counts to obtain more accurate estimates of the true values.

In this analysis therefore, average values, not only of yarn count, but also of stitch length, have been used, and these are shown in Table III.

The analysis has been carried out solely on the results of the 28 gauge fabric evaluation, without any reference to other studies, such as the earlier 20 gauge interlock data. A study of the combined 20 and 28 gauge data will form the subject of a later report.

The yarn count and stitch length data were examined in a similar fashion to previous studies, using simple linear regression analysis. Equations were derived relating the reference state data after processing to the corresponding data for the fabric in the "as knitted" state. Yarn count equations are shown in figures 1 - 3, and stitch length equations in figures 4 - 6. In each case equation 1 is of the form $y = A + Bx$, and equation 2 of the form $y = Ax$ assuming in the latter case that it will pass through the origin.

In figures 1 and 4, which show data for the grey fabrics, equation 3 represents the relationships reported in Research Record No. 162.

Still following the lines of earlier work, relationships were then derived linking fabric weight in the reference state to the ratio of Tex/l, also in the reference state, and the resulting equations, again in the forms $y = A + Bx$ and $y = Ax$, are shown in figures 7 - 9.

Multiple linear regression analysis was employed to derive equations for course and wale spacings, in the reference state, of the form

$$y = A + B/l + C\sqrt{tex}$$

which has been found from earlier studies to give reasonable results. Graphs for these equations are shown in figures 10 - 15.

Finally, multiple linear regression analysis was again used to derive equations for stitch density, this time using the model

$$y = A + B/l^2 + C\ Tex$$

and graphs showing the fit of these equations to the observed data are given in figures 16 - 18.

The equations derived in this study are summarised in Table V, together with the corresponding correlation coefficients.

It will have been noted that other data, in particular strength and thickness measurements, have not been analysed here. However, the figures are included in the tables, so that they can be studied at a later date.

CONCLUSIONS

A major problem during the processing of these fabrics was the difficulty encountered in trying to achieve width targets. The fabric behaviour was consistent with the targets being too low; the results of the shrinkage tests, showing approximately 15% width shrinkage, were therefore rather surprising, although they validated the method whereby the targets had been calculated in the first place.

Course spacing targets, on the other hand, were never achieved and the resultant length shrinkage figures bear this out. As the care and attention which went into the processing of these fabrics, and particularly the drying and calendering, was probably much greater than is usual in commercial operations, it must be concluded that the equipment available was not altogether suitable for these lighterweight fabrics.

It would be interesting to see how these fabrics would behave in a relaxing dryer such as a "Roto-Swing".

With regard to the data analysis, this has followed the system employed in previous studies, and the models examined have been those which have been found by intuition and experience to fit the data adequately. However, in the figures showing yarn count, stitch length and fabric weight data, the opportunity has been taken to examine the fit of equations without a constant term, that is, equations which are assumed to pass through the origin. In general,it appears that these equations might also give adequate fit.

In common with other interlock studies, the yarn count effect has been shown to be of considerable importance in the equations for course and wale spacings, especially wales, its significance in the stitch density equations however, is less pronounced.

Finally, returning for a moment to the "F-factors" concept, these can now be recalculated from the reference state course and wale spacings given in Tables I and II, together with the corresponding data for the grey fabrics given in Research Record No. 162. When this is done, the revised values are:-

winch dyed,	course spacing	0.91
	wale spacing	0.97
winch bleached	course spacing	0.94
	wale spacing	0.97

Width targets on this basis, should thus have been about 3% wider; a conclusion which does not altogether tie up with the observed shrinkage behaviour.

PFG/SW
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INTERLOCK FABRICS - 28 GAUGE

Table : I

WINCH DYED FABRIC TEST RESULTS

SAMPLE	StL.BW WD	StL.AW WD	Y.Ne WD	Y.Str. WD	%Ext. WD	%Shr.L WD	%Shr.W WD
I50/236	2.374	2.372	52.73	191.4	7.2	14.2	15.4
I50/248	2.463	2.455	52.26	190.3	7.2	15.5	15.6
I50/260	2.575	2.567	51.8	182.7	7.3	16.6	15.4
I50/273	2.735	2.715	51.8	190.9	7.5	17.9	15.9
I50/287	2.838	2.835	51.35	178.2	7.2	17.9	16.1
I60/236	2.352	2.329	62.16	138.5	6.8	15.4	15.4
I60/248	2.472	2.46	63.5	139.1	6.7	16	13.4
I60/260	2.585	2.57	62.16	128.4	6.6	17.2	14.9
I60/273	2.721	2.704	62.16	141	6.7	17.3	16.7
I60/287	2.847	2.847	62.82	153.4	6.6	18.6	15.4
I70/236	2.339	2.33	72.02	115.7	6.5	15.2	15.5
I70/248	2.46	2.46	72.02	117	6.6	17.4	14.6
I70/260	2.57	2.561	72.91	124.1	6.7	19.6	12.7
I70/273	2.723	2.71	72.91	114.1	6.3	20.1	14.9
I70/287	2.845	2.824	73.82	112	6.2	19.7	15.3

SAMPLE	C/3cmB WD	C/3cmA WD	W/3cmB WD	W/3cmA WD	Wt.BW WD	Wt.AW WD	Wid.BW WD
I50/236	58.1	65.8	48.8	56.6	166.6	225.6	82.2
I50/248	55.1	61.8	47.7	55.5	164	220	83.3
I50/260	51.2	57.6	46.1	55.6	152.8	211	86.1
I50/273	46.5	53.7	46.4	52.9	145.6	196.9	86.6
I50/287	44.2	52.4	45	51.6	137.3	192.4	88.8
I60/236	54.7	66.8	46.8	59	136.2	185.3	79.2
I60/248	51.3	59.3	47.9	56.4	133.2	173.1	79.8
I60/260	46.9	55.7	45.2	54.6	127.2	170.7	80.1
I60/273	46.1	53.6	46.6	55.8	117.3	164.6	84.8
I60/287	42.7	51.8	46.5	52.6	114.7	156.8	84.7
I70/236	53.4	63.1	46.5	59.7	121.4	161.1	77.6
I70/248	49	60.8	46.4	59.1	112.1	154.3	77.4
I70/260	47.2	57.5	51.2	57.8	111	148.2	78.1
I70/273	39.5	50.9	45.9	56.6	98.5	140.8	80.5
I70/287	39.8	50	46.1	53.4	99	136	82.3

SAMPLE	Spr.BW WD	Spr.AW WD	Bst.BW WD	Bst.AW WD	DistBW WD	DistAW WD	Thkns WD
I50/236	0.6	0.5	741.4	799.9	18.6	21.1	979
I50/248	-0.2	0.5	730.3	783.3	19.3	21.2	1013
I50/260	0	0.5	671.9	738.5	18	21.1	1033
I50/273	-0.5	0.1	694.2	699.5	17.4	20.9	1042
I50/287	-0.3	0.9	631.8	674.5	18.7	21.6	1037
I60/236	1.9	0.6	551.8	624.7	18	21.1	920
I60/248	1	0.1	586.7	630.2	19.3	21.3	953
I60/260	2.7	0.4	491.5	589.4	17.3	21.4	954
I60/273	0.9	1	555	563.8	18.3	21.3	1006
I60/287	-0.2	0.5	512.3	520.8	16.8	20.4	1002
I70/236	0.5	0.5	476.9	522.6	17.3	21	912
I70/248	1	0.3	468.8	522.1	16.7	20.6	917
I70/260	0.3	-0.2	502.4	510.1	16.9	20.5	934
I70/273	2.1	0.2	446	489.2	17.2	20.7	945
I70/287	1.3	0.5	395.2	448.8	16.5	20.7	983

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Table : II

WINCH BLEACHED FABRIC TEST RESULTS

SAMPLE	StL.BW WB	StL.AW WB	Y.Ne WB	Y.Str. WB	%Ext. WB	%Shr.L WB	%Shr.W WB
I50/236	2.35	2.337	52.73	193.7	7.1	14.8	16.7
I50/248	2.472	2.45	52.26	190.7	7.5	15.8	15.4
I50/260	2.587	2.572	51.8	190.8	7.3	16.3	16.7
I50/273	2.731	2.715	53.2	184.2	7	18.8	13.8
I50/287	2.86	2.842	52.26	183.9	7.3	19	13.9
I60/236	2.369	2.35	65.62	157.2	6.6	17.7	14.2
I60/248	2.493	2.479	64.19	162.4	6.5	20.3	12.4
I60/260	2.596	2.64	65.62	158.2	6.3	18.8	13.4
I60/273	2.737	2.73	65.62	148.9	7	19.3	15.1
I60/287	2.872	2.849	66.35	150.5	7	20.7	15
I70/236	2.374	2.37	73.82	135.8	6.1	17.9	14.8
I70/248	2.495	2.486	73.82	127.7	6.1	19.3	13.4
I70/260	2.607	2.645	74.75	122.4	6.5	20.8	13.6
I70/273	2.742	2.733	75.71	136	6.5	23.4	12.1
I70/287	2.876	2.903	76.69	138.9	6.1	23.9	11.1

SAMPLE	C/3cmB WB	C/3cmA WB	W/3cmB WB	W/3cmA WB	Wt.BW WB	Wt.AW WB	Wid.BW WB
I50/236	57.7	68.6	47.6	56.5	160.3	224.4	82.9
I50/248	53.6	64.3	48.4	56	157.3	216.4	84.1
I50/260	49.8	60.4	46.3	55.7	145	208.5	86.8
I50/273	45.2	57.5	46.7	52.7	140.7	195.5	86.2
I50/287	43	52.9	46.3	51.1	135.3	187.83	87.5
I60/236	54.6	67.7	48.4	57.7	132.4	183.2	79.2
I60/248	48.4	62.9	49.1	55.9	127.6	176.2	80.2
I60/260	43.3	58.2	44.4	56.2	118.6	167.4	81
I60/273	43.5	56.2	48.3	54.6	114.9	161.8	81.8
I60/287	40.6	51.6	47.4	52.3	107.8	150.13	84.1
I70/236	49.9	65.3	46.7	60.5	112.4	160.4	78.9
I70/248	49.5	60.9	51.8	58.6	105	152.1	78.4
I70/260	45.7	58.2	50.8	56.3	103.2	140.2	79.5
I70/273	40.6	55	45.4	56.6	97.3	138.8	80.8
I70/287	37.2	50.3	46.3	55.7	96.8	136.25	82.7

SAMPLE	Spr.BW WB	Spr.AW WB	Bst.BW WB	Bst.AW WB	DistBW WB	DistAW WB	Thkns WB
I50/236	0.8	0.6	757.3	856	14.2	17	939
I50/248	0.7	0.8	773.9	827	14.6	17.6	985
I50/260	0.1	0.7	737.8	796.8	12.8	17.6	983
I50/273	0.7	0.8	697.9	801.2	10	17.4	999
I50/287	0.3	0.5	694.8	726.4	13.6	16.9	1021
I60/236	-0.9	-0.2	590.5	726.1	15.7	20.3	875
I60/248	1.1	0.1	619.9	680	15.8	20	883
I60/260	-1.3	-0.2	536.1	640.6	15.5	19.7	895
I60/273	1	1.2	534.9	626.3	11.4	16.9	950
I60/287	0.3	0.1	518	600.9	11.7	17.6	996
I70/236	0.9	0.4	521.4	572.3	15.8	19.7	842
I70/248	2.5	0.3	572.7	555.4	15.7	19.7	860
I70/260	-0.7	0.8	513.3	544.8	15.8	19.8	874
I70/273	0.1	-0.2	512.8	528.4	15.3	19.3	905
I70/287	1	0.4	461.1	526.4	14.8	19.9	916

INTERLOCK FABRICS - 28 GAUGE

Table : III

Average Yarn Counts

Nominal Ne	Grey Knitted Tex	Grey AW Tex	Dyed AW Tex	Bleached AW Tex
50	12.02	11.36	11.36	11.26
60	9.45	9.34	9.44	9.02
70	8.27	8.10	8.12	7.88

Average Stitch Lengths

Nominal cm.	Grey Knitted cm.	Grey AW cm.	Dyed AW cm.	Bleached AW cm.
0.236	0.240	0.236	0.234	0.235
0.248	0.252	0.249	0.246	0.247
0.260	0.264	0.260	0.257	0.262
0.273	0.278	0.274	0.271	0.273
0.287	0.290	0.287	0.284	0.286

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Table : IV

Predicted & observed relaxed course & wale spacings.

Ref.	Courses per 3 cm.			Wales per 3cm.		
	Predicted	WD	WB	Predicted	WD	WB
50/236	65.7	65.8	68.6	56.6	56.6	56.5
50/248	62.2	61.8	64.3	55.4	55.5	56.0
50/260	59.0	57.6	60.4	54.4	55.6	55.7
50/273	55.9	53.7	57.5	53.4	52.9	52.7
50/287	52.8	52.4	52.9	52.4	51.6	51.1
60/236	64.7	66.8	67.7	59.7	59.0	57.7
60/248	61.2	59.3	62.9	58.6	56.4	55.9
60/260	58.0	55.7	58.2	57.6	54.6	56.2
60/273	54.8	53.6	56.2	56.6	55.8	54.6
60/287	51.8	51.8	51.6	55.6	52.6	52.3
70/236	63.9	63.1	65.3	62.1	59.7	60.5
70/248	60.3	60.8	60.9	61.1	59.1	58.6
70/260	57.1	57.5	58.2	60.0	57.8	56.3
70/273	54.0	50.9	55.0	59.0	56.6	56.6
70/287	51.0	50.0	50.3	58.2	53.4	55.7

Table : V

INTERLOCK - 28 Gauge

PREDICTION OF AVERAGE FULLY RELAXED TEX FROM ACTUAL TEX AS KNITTED

MODEL	y=a+bx			y=ax	
	a	b	r^2	a	r^2
Grey	1.1158	0.8558	0.9946	0.9657	0.9778
Winch Dyed	1.2626	0.8451	0.9892	0.9693	0.9672
Winch Bleached	0.4992	0.8965	0.9994	0.9457	0.9963

PREDICTION OF AVERAGE FULLY REL. STITCH LENGTH FROM STITCH LENGTH AS KNITTED

MODEL	y=a+bx			y=ax	
	a	b	r^2	a	r^2
Grey	-0.0057	1.0078	0.9993	0.9864	0.9988
Winch Dyed	-0.0043	0.9922	0.9993	0.9758	0.9990
Winch Bleached	-0.0080	1.0144	0.9961	0.9841	0.9952

PREDICTION OF FULLY RELAXED WEIGHT FROM AVERAGE F.R. TEX & STITCH LENGTH

MODEL	y=a+bx			y=ax	
	a	b	r^2	a	r^2
Grey	32.3408	4.3785	0.9843	5.2334	0.9459
Winch Dyed	-0.6943	4.7085	0.9888	4.6904	0.9888
Winch Bleached	6.5739	4.6056	0.9931	4.7824	0.9916

PREDICTION OF F.R. COURSES PER 3cm FROM AVERAGE F.R. TEX & STITCH LENGTH

MODEL	$y=a+b/l+c\sqrt{tex}$			
	a	b	c	r^2
Grey	-28.0423	20.2984	4.1403	0.9893
Winch Dyed	-26.9836	18.9772	3.4188	0.9505
Winch Bleached	-31.4669	19.6208	4.9411	0.9855

PREDICTION OF F.R. WALES PER 3cm FROM AVERAGE F.R. TEX & STITCH LENGTH

MODEL	$y=a+b/l+c\sqrt{tex}$			
	a	b	c	r^2
Grey	74.6617	3.7770	-10.1905	0.9687
Winch Dyed	44.5065	7.2536	-5.4560	0.8891
Winch Bleached	46.8896	6.5017	-5.3041	0.8511

PREDICTION OF F.R.STITCH DENSITY FROM AVERAGE F.R. TEX & STITCH LENGTH

MODEL	$y=a+b/l^2+c(tex)$			
	a	b	c	r^2
Grey	157.9542	20.3579	-5.9831	0.9877
Winch Dyed	43.5506	21.3533	-1.1692	0.9605
Winch Bleached	84.9004	21.3505	-3.7612	0.9822

Figure 1

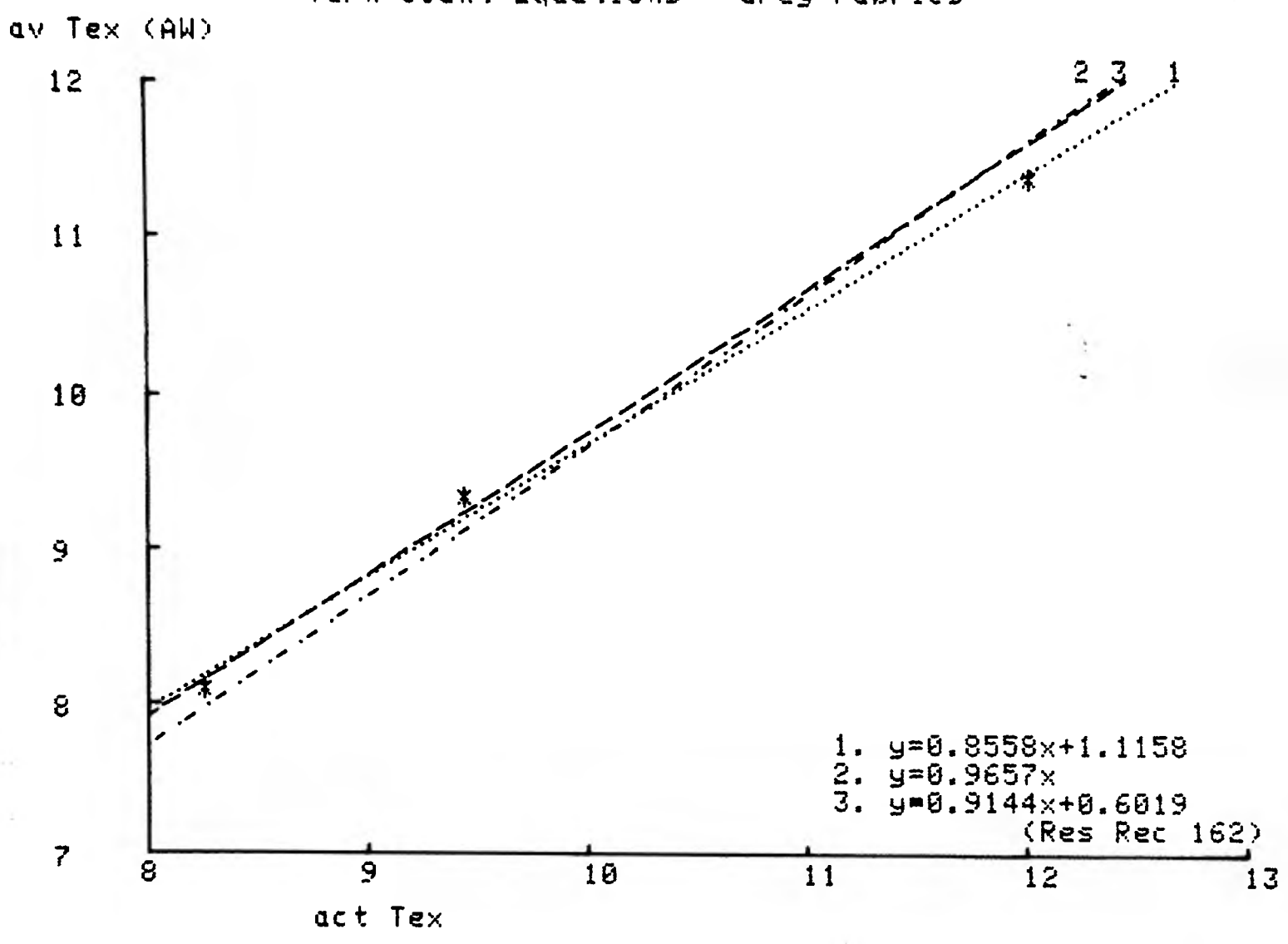

Yarn Count Equations - Grey Fabrics
av Tex (AW)
12
11
10
9
8
7
8
9
10
11
12
13
act Tex
2 3 1
1. y=0.8558x+1.1158
2. y=0.9657x
3. y=0.9144x+0.6019
(Res Rec 162)

Figure 2

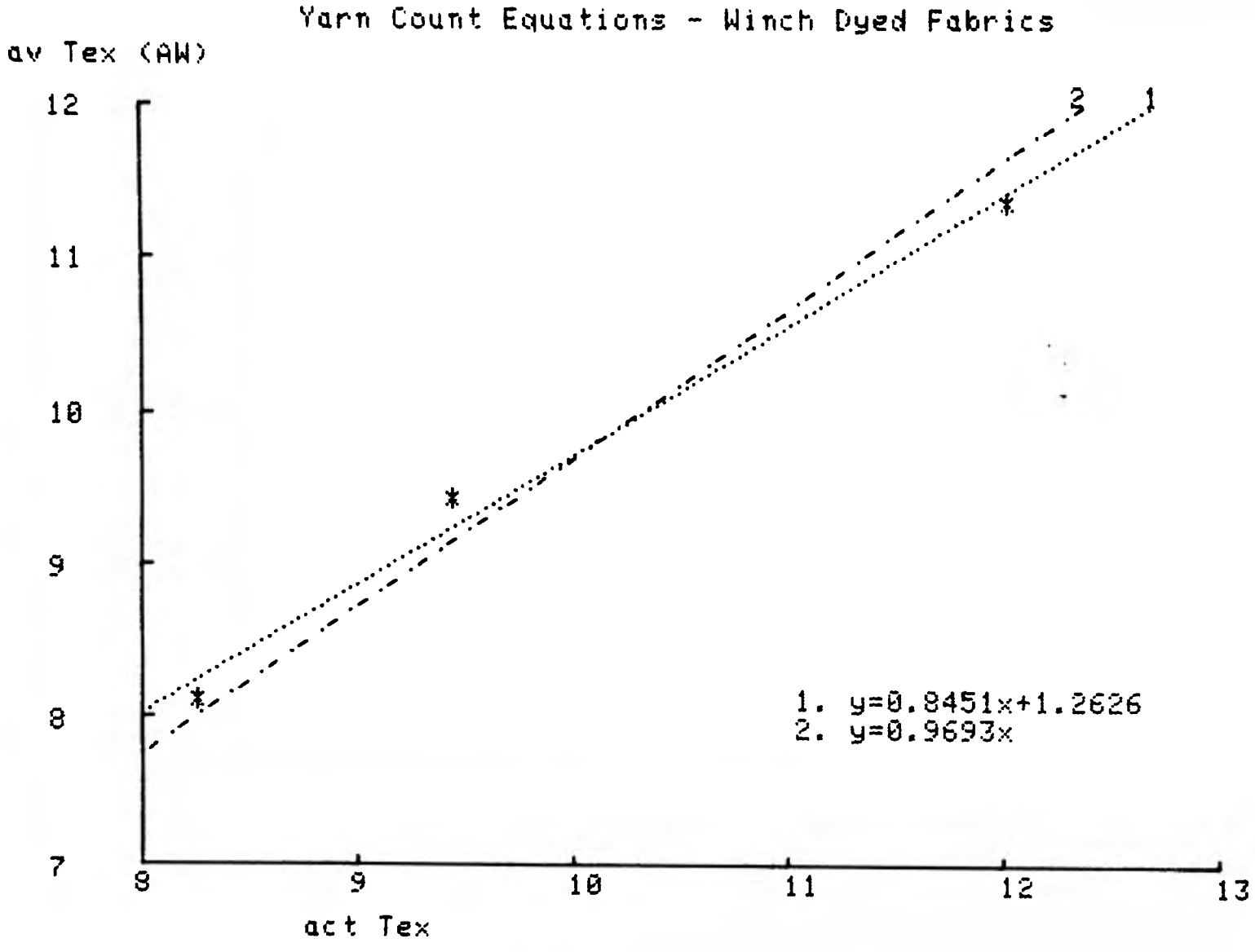

Yarn Count Equations - Winch Dyed Fabrics
av Tex (AW)
12
11
10
9
8
7
8
9
10
11
12
13
act Tex
2
1
1. y=0.8451x+1.2626
2. y=0.9693x

Figure 3

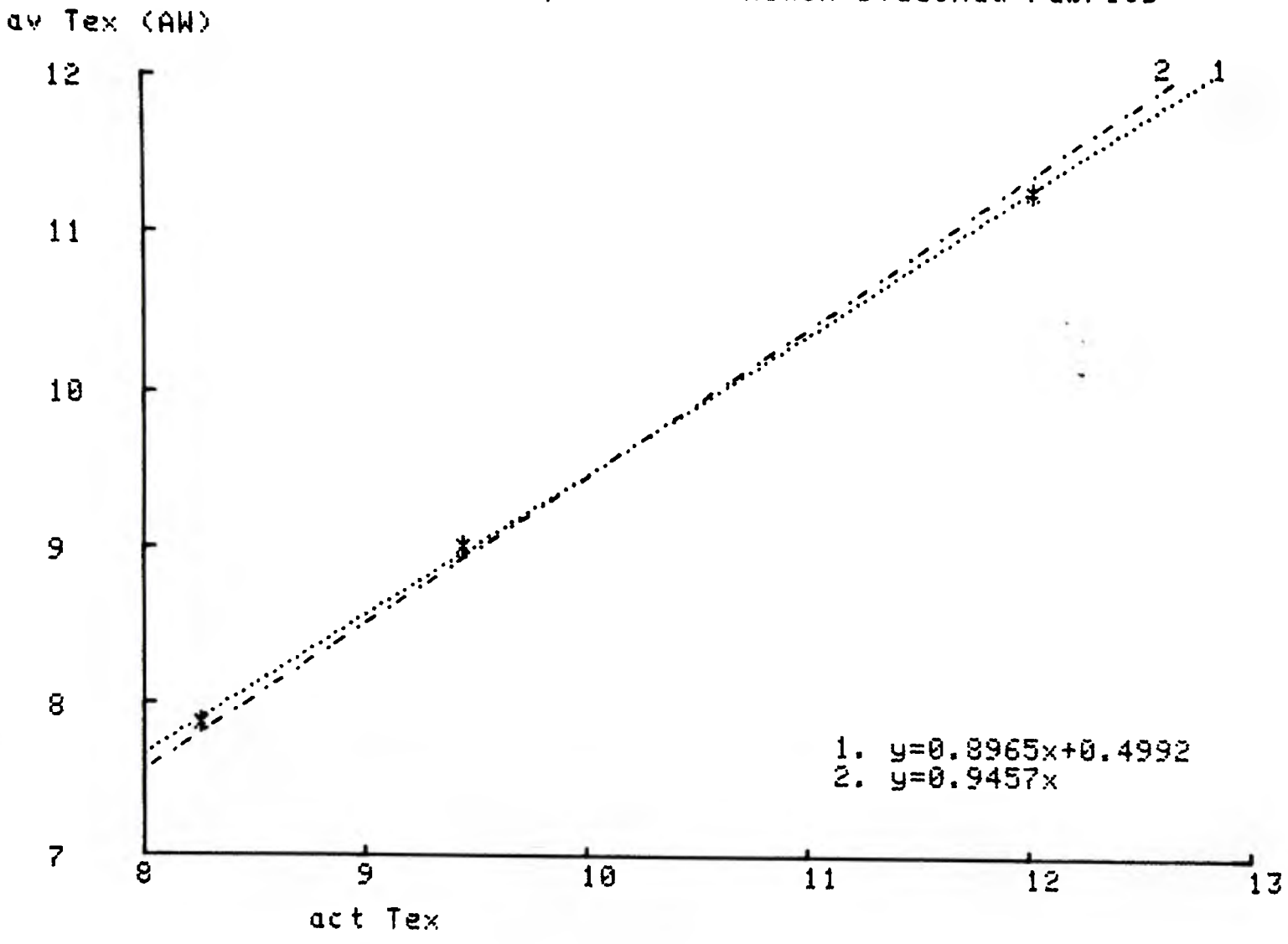

Yarn Count Equations - Winch Bleached Fabrics
av Tex (AW)
12
11
10
9
8
7
2
1
1. y=0.8965x+0.4992
2. y=0.9457x
8
9
10
11
12
13
act Tex

Figure 4

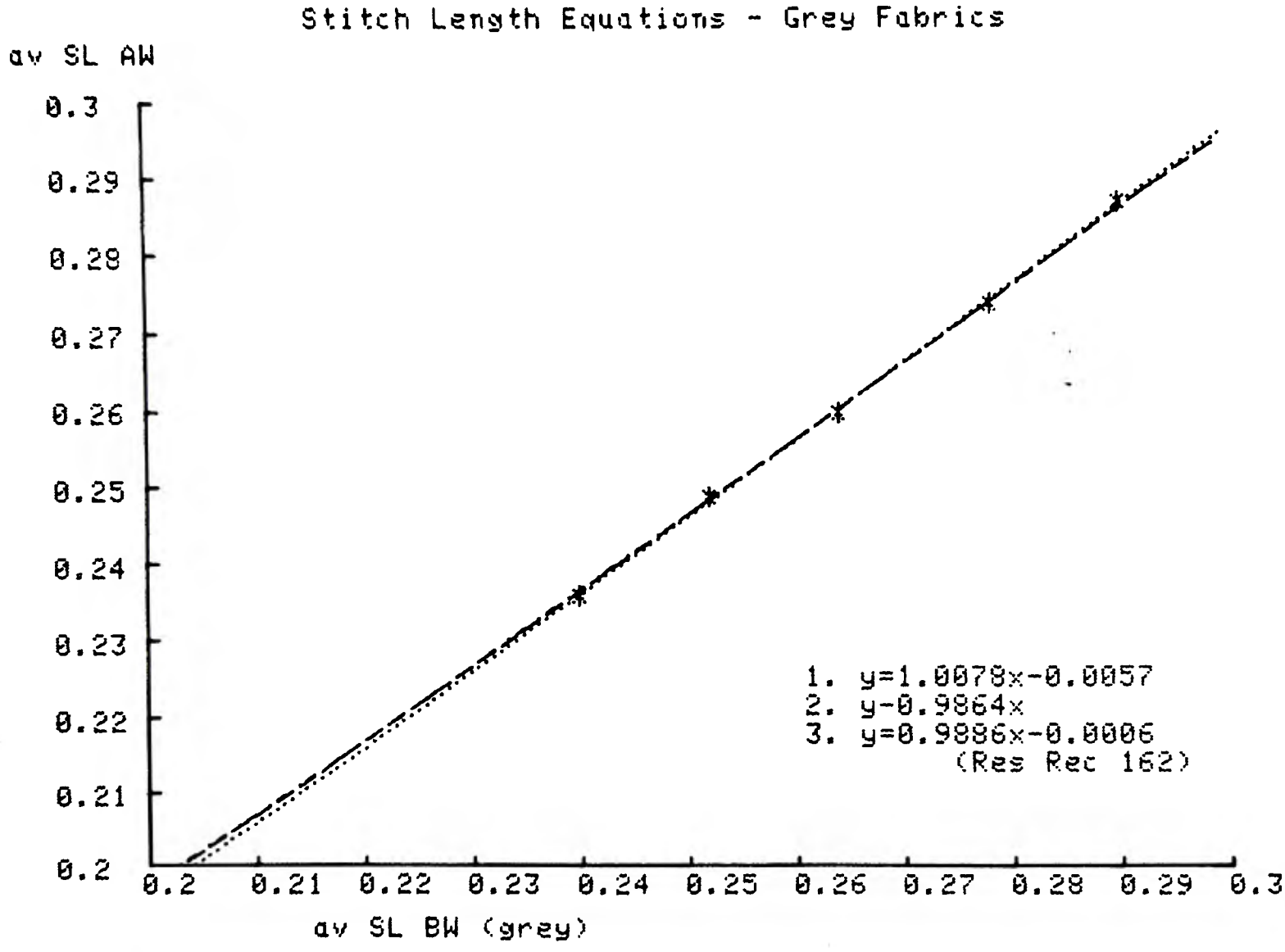

Stitch Length Equations - Grey Fabrics
av SL AW
0.3
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.2
0.2
0.21
0.22
0.23
0.24
0.25
0.26
0.27
0.28
0.29
0.3
av SL BW (grey)
1. y=1.0078x-0.0057
2. y-0.9864x
3. y=0.9886x-0.0006
(Res Rec 162)

Figure 5

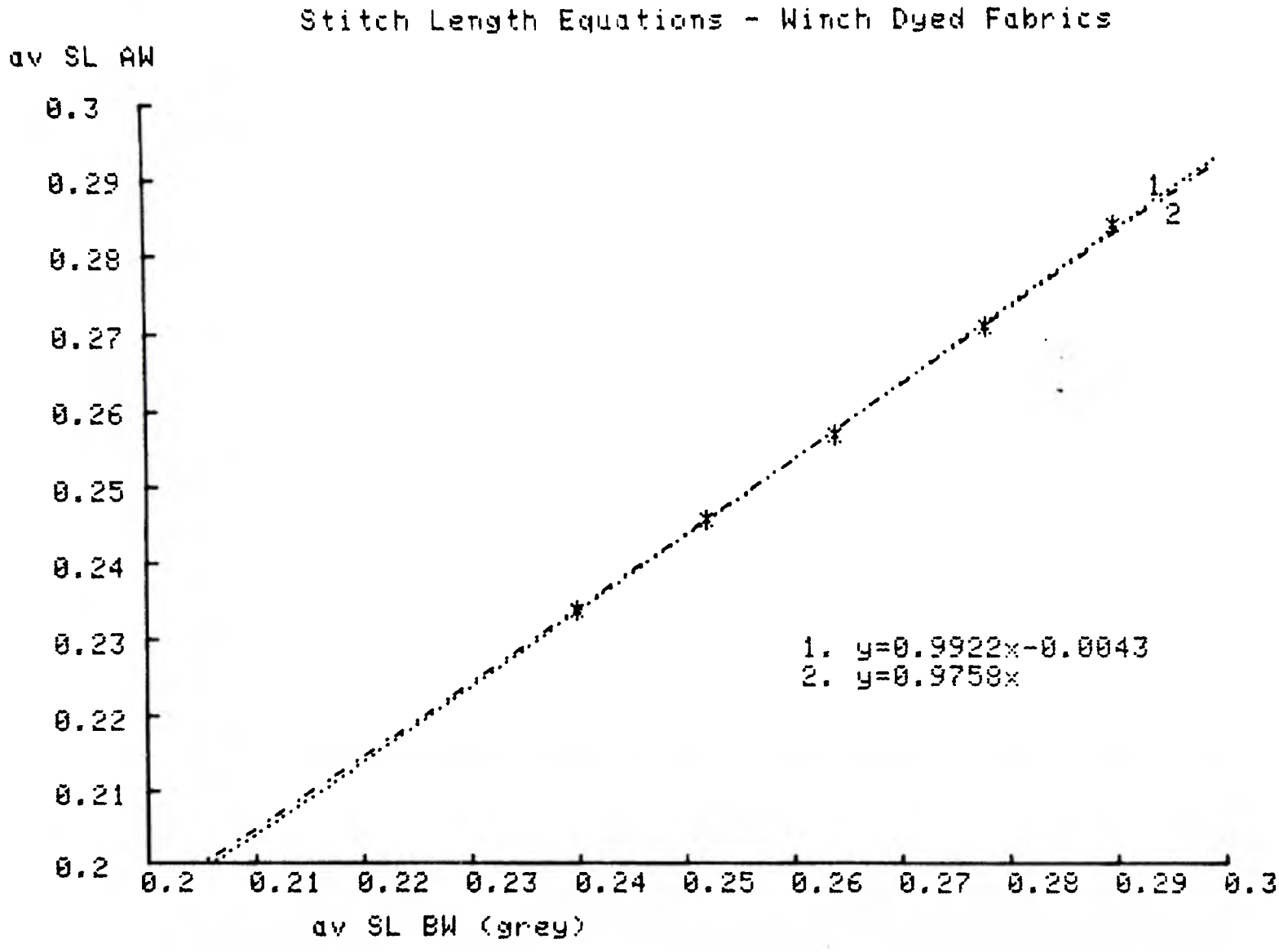

Stitch Length Equations - Winch Dyed Fabrics
av SL AW
0.3
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.2
0.2
0.21
0.22
0.23
0.24
0.25
0.26
0.27
0.28
0.29
0.3
av SL BW (grey)
1
2
1. y=0.9922x-0.0043
2. y=0.9758x

Figure 6

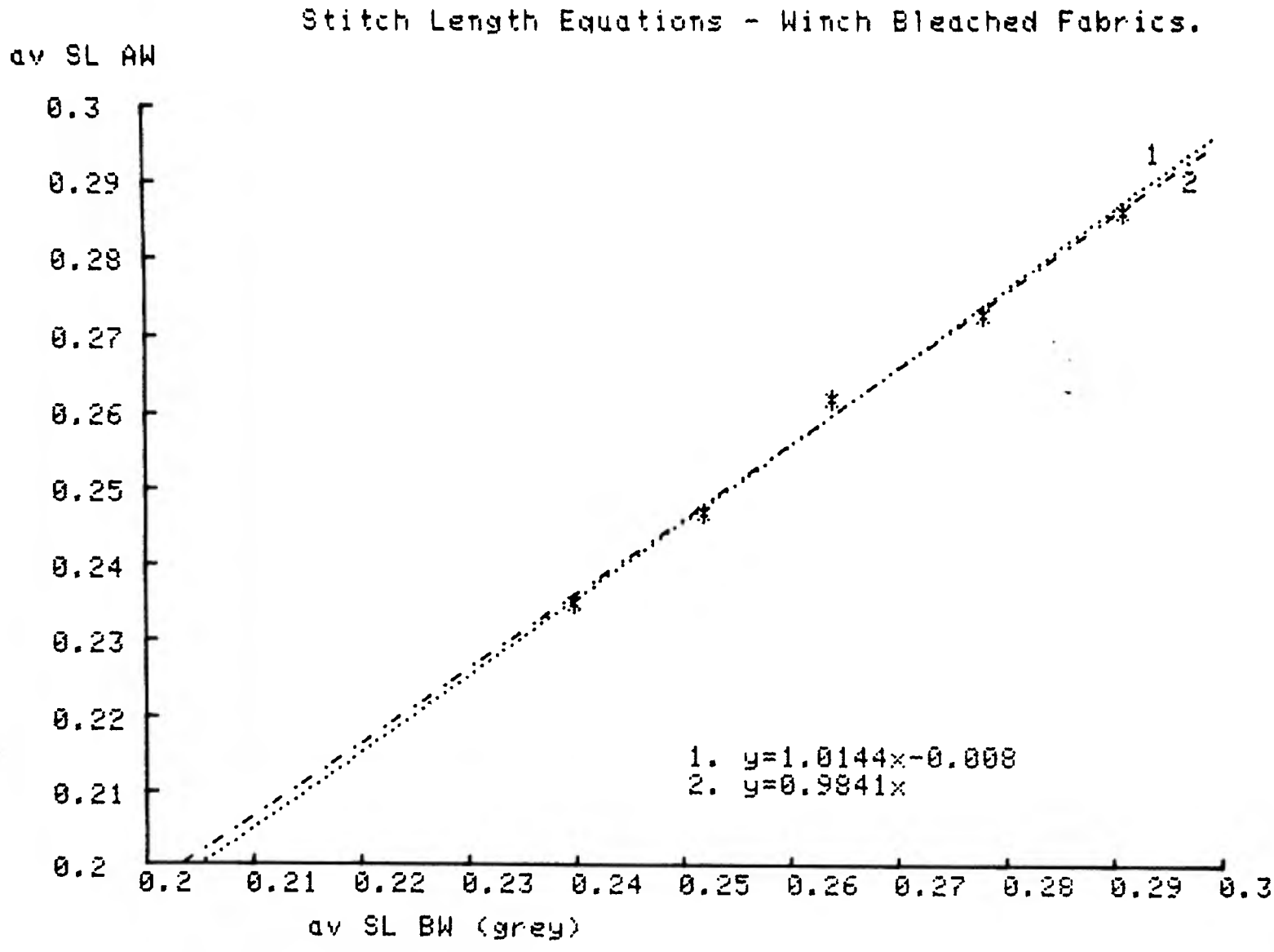

Stitch Length Equations - Winch Bleached Fabrics.
av SL AW
0.3
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.2
0.2
0.21
0.22
0.23
0.24
0.25
0.26
0.27
0.28
0.29
0.3
av SL BW (grey)
1
2
1. y=1.0144x-0.008
2. y=0.9841x

Figure 7

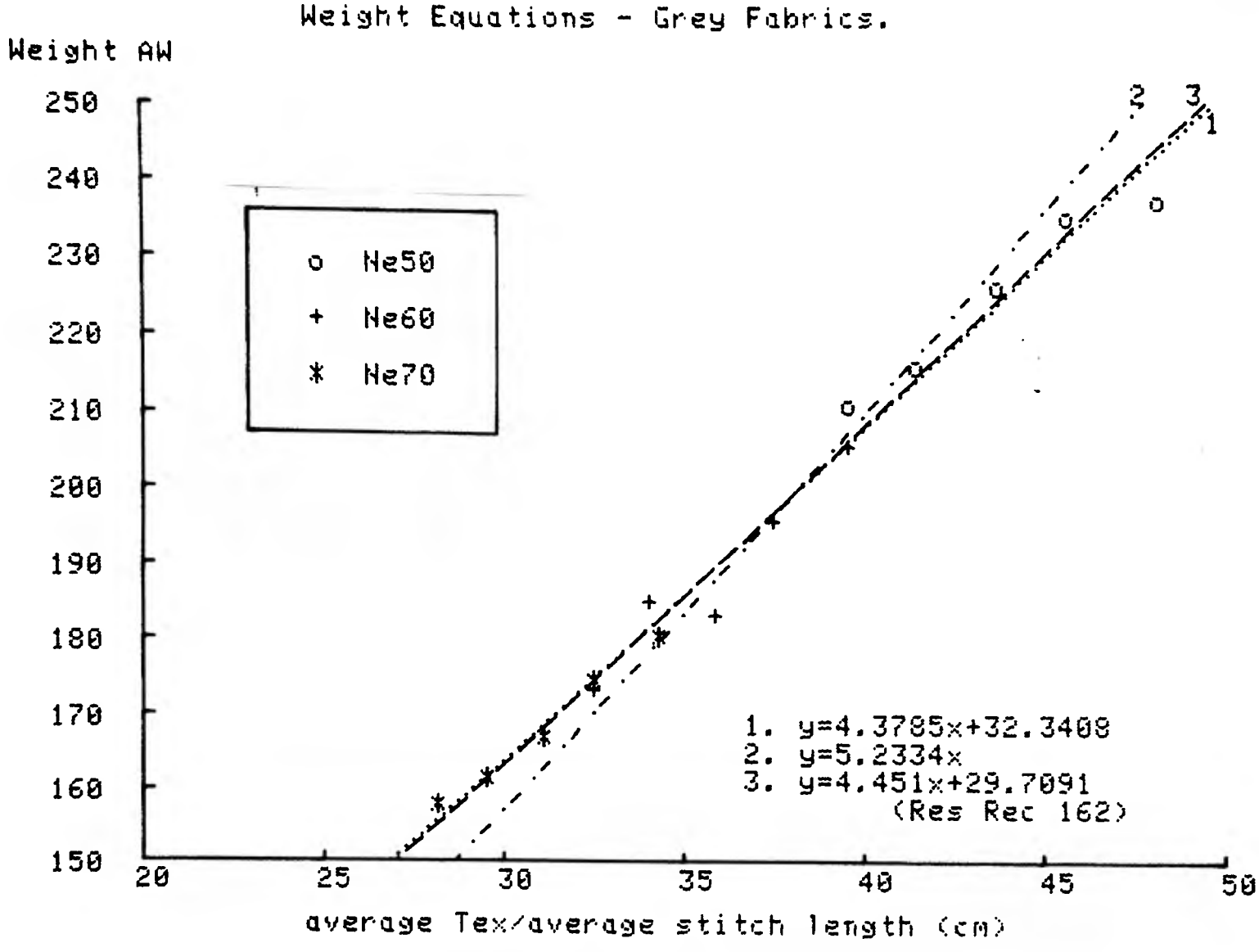

Weight Equations - Grey Fabrics.
Weight AW
250
240
230
220
210
200
190
180
170
160
150
o Ne50
+ Ne60
* Ne70
1. y=4.3785x+32.3408
2. y=5.2334x
3. y=4.451x+29.7091
(Res Rec 162)
20
25
30
35
40
45
50
average Tex/average stitch length (cm)

Figure 8

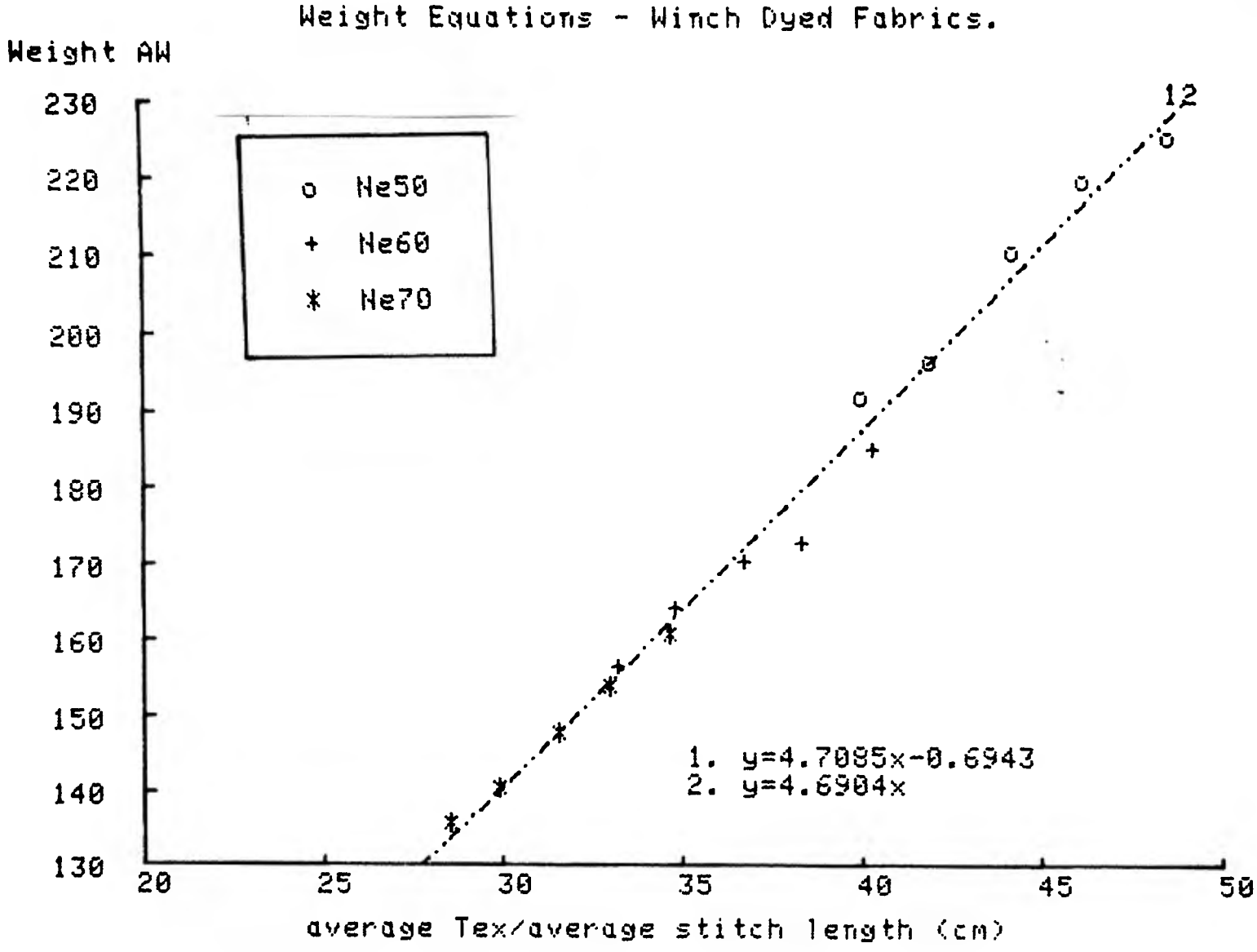

Weight Equations - Winch Dyed Fabrics.
Weight AW
230
220
210
200
190
180
170
160
150
140
130
20
25
30
35
40
45
50
o Ne50
+ Ne60
* Ne70
1. y=4.7085x-0.6943
2. y=4.6904x
average Tex/average stitch length (cm)

Figure 9

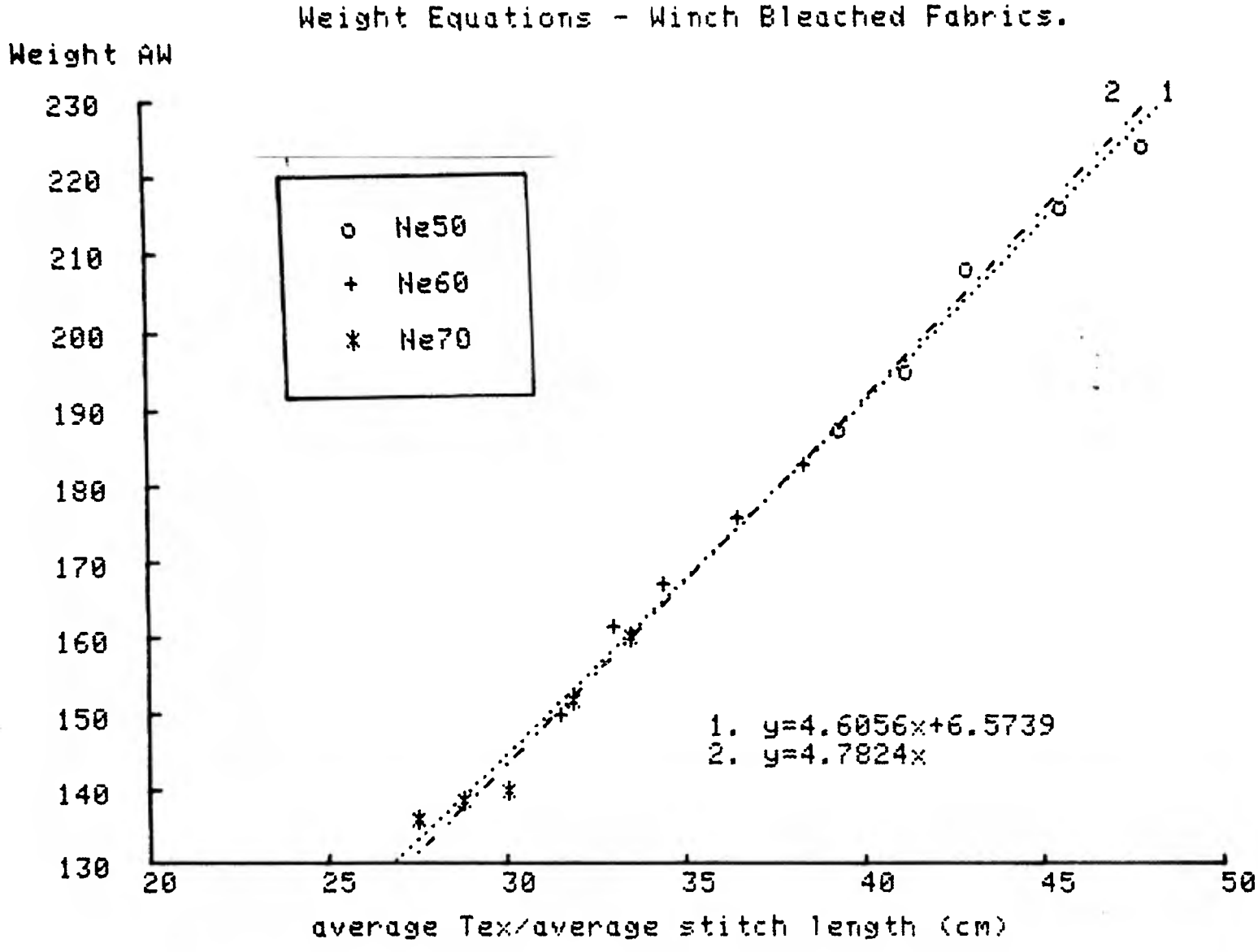

Weight Equations - Winch Bleached Fabrics.
Weight AW
230
220
210
200
190
180
170
160
150
140
130
20
25
30
35
40
45
50
o Ne50
+ Ne60
* Ne70
1. y=4.6056x+6.5739
2. y=4.7824x
average Tex/average stitch length (cm)

Figure 10

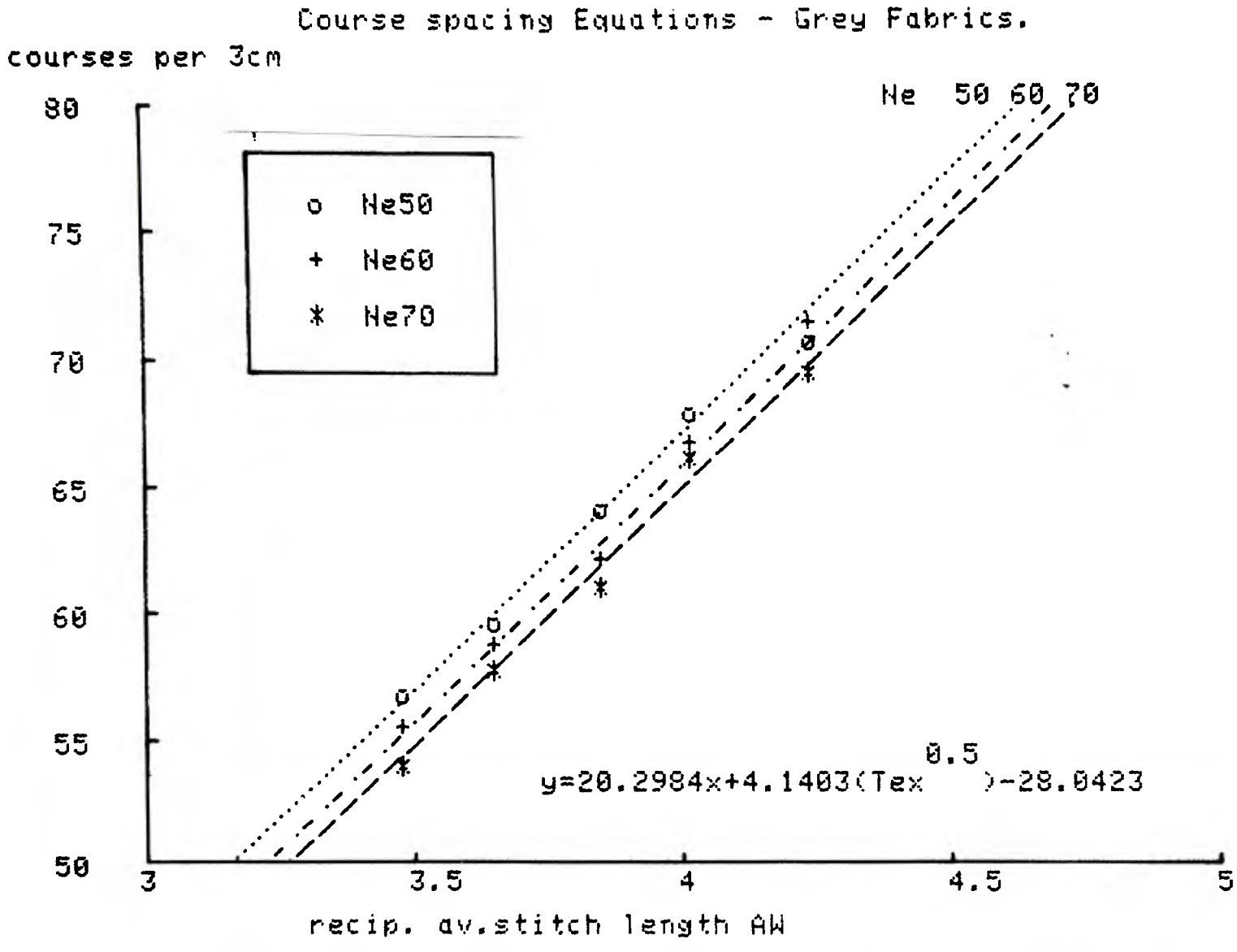

Course spacing Equations - Grey Fabrics.
courses per 3cm
Ne 50 60 70
o Ne50
+ Ne60
* Ne70
y=20.2984x+4.1403(Tex 0.5)-28.0423
80
75
70
65
60
55
50
3
3.5
4
4.5
5
recip. av.stitch length AW

Figure 11

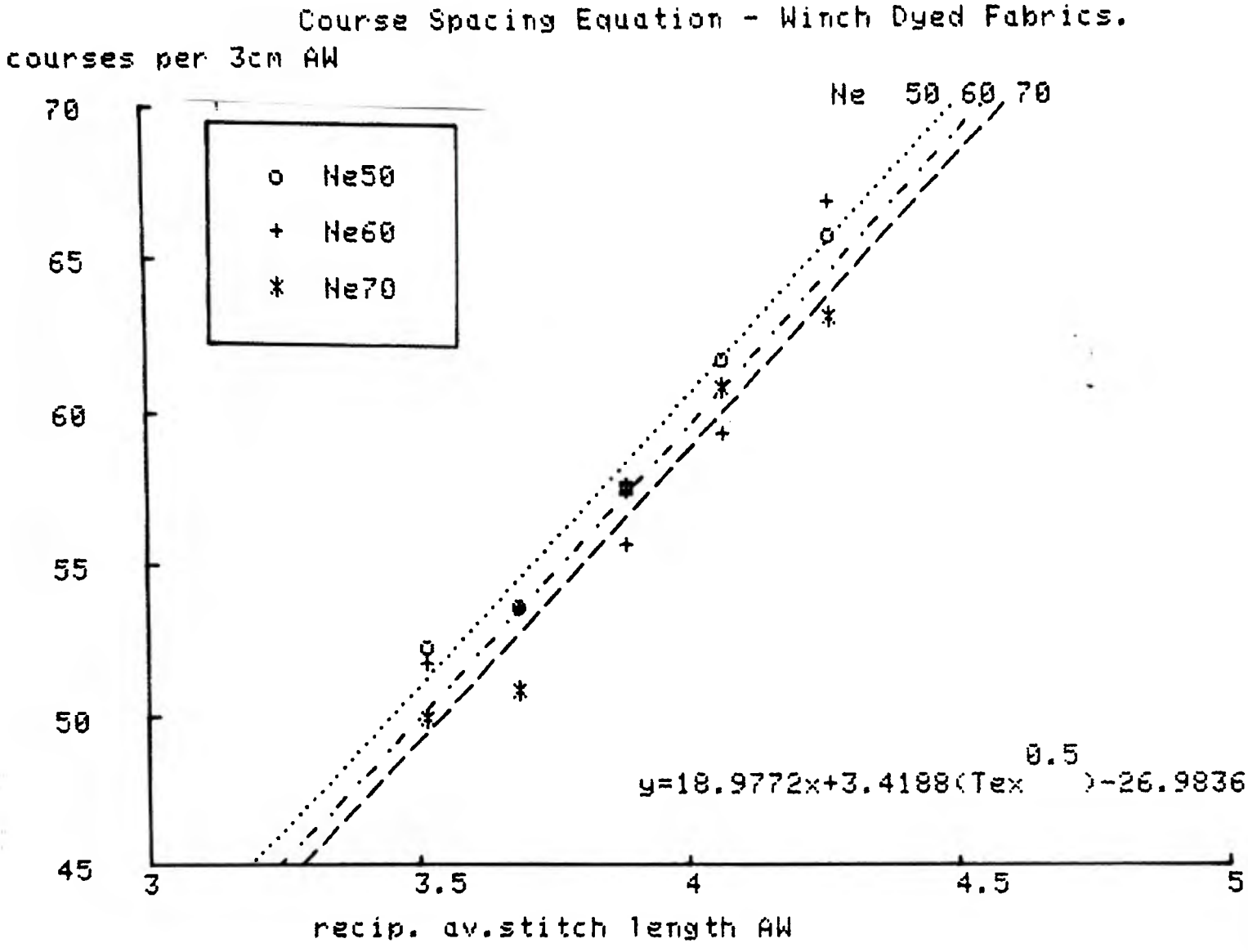

Course Spacing Equation - Winch Dyed Fabrics.
courses per 3cm AW
Ne 50 60 70
o Ne50
+ Ne60
* Ne70
70
65
60
55
50
45
3
3.5
4
4.5
5
y=18.9772x+3.4188(Tex^0.5)-26.9836
recip. av.stitch length AW

Figure 12

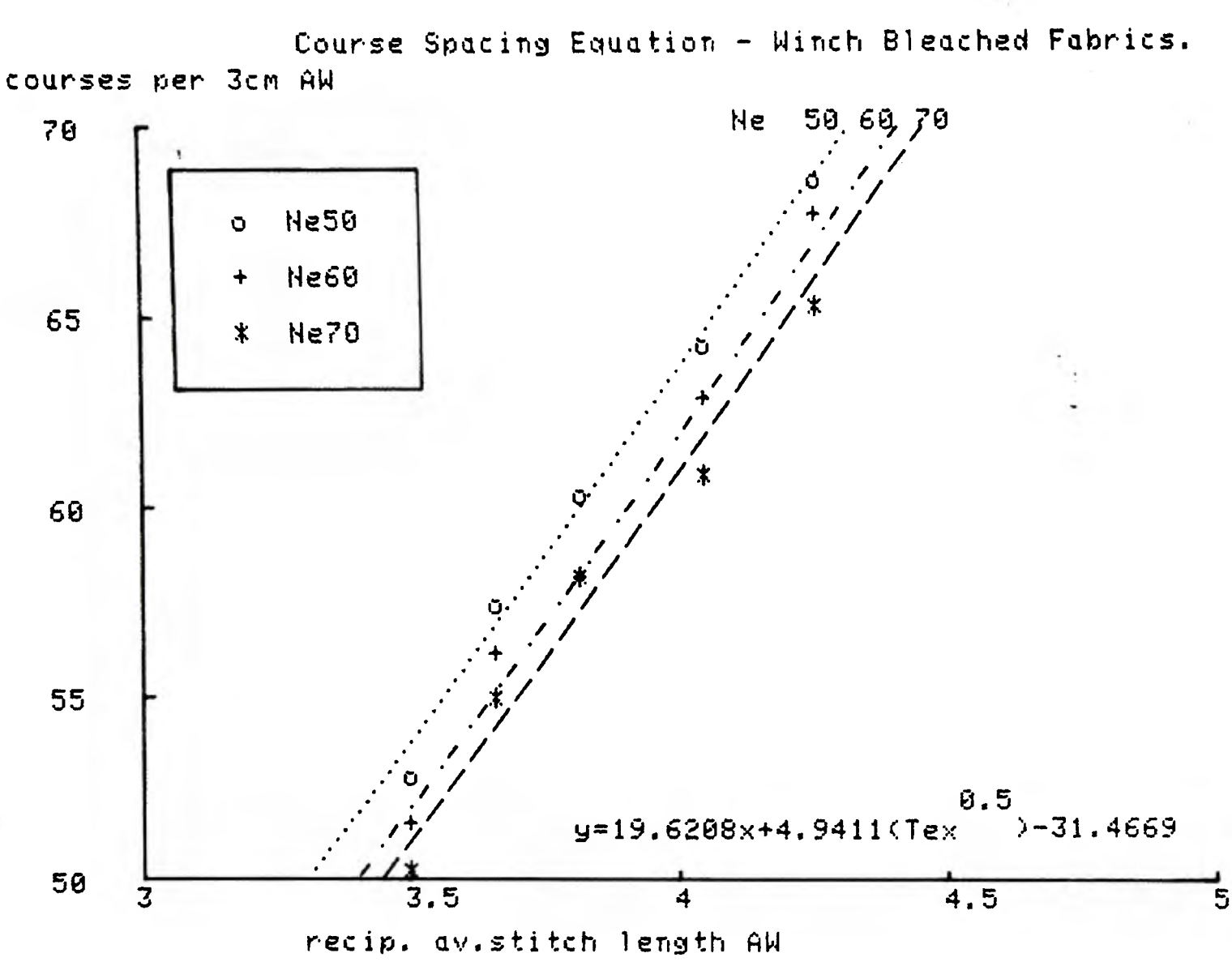

Course Spacing Equation - Winch Bleached Fabrics.
courses per 3cm AW
Ne 50 60 70
o Ne50
+ Ne60
* Ne70
y=19.6208x+4.9411(Tex^0.5)-31.4669
70
65
60
55
50
3
3.5
4
4.5
5
recip. av.stitch length AW

Figure 13

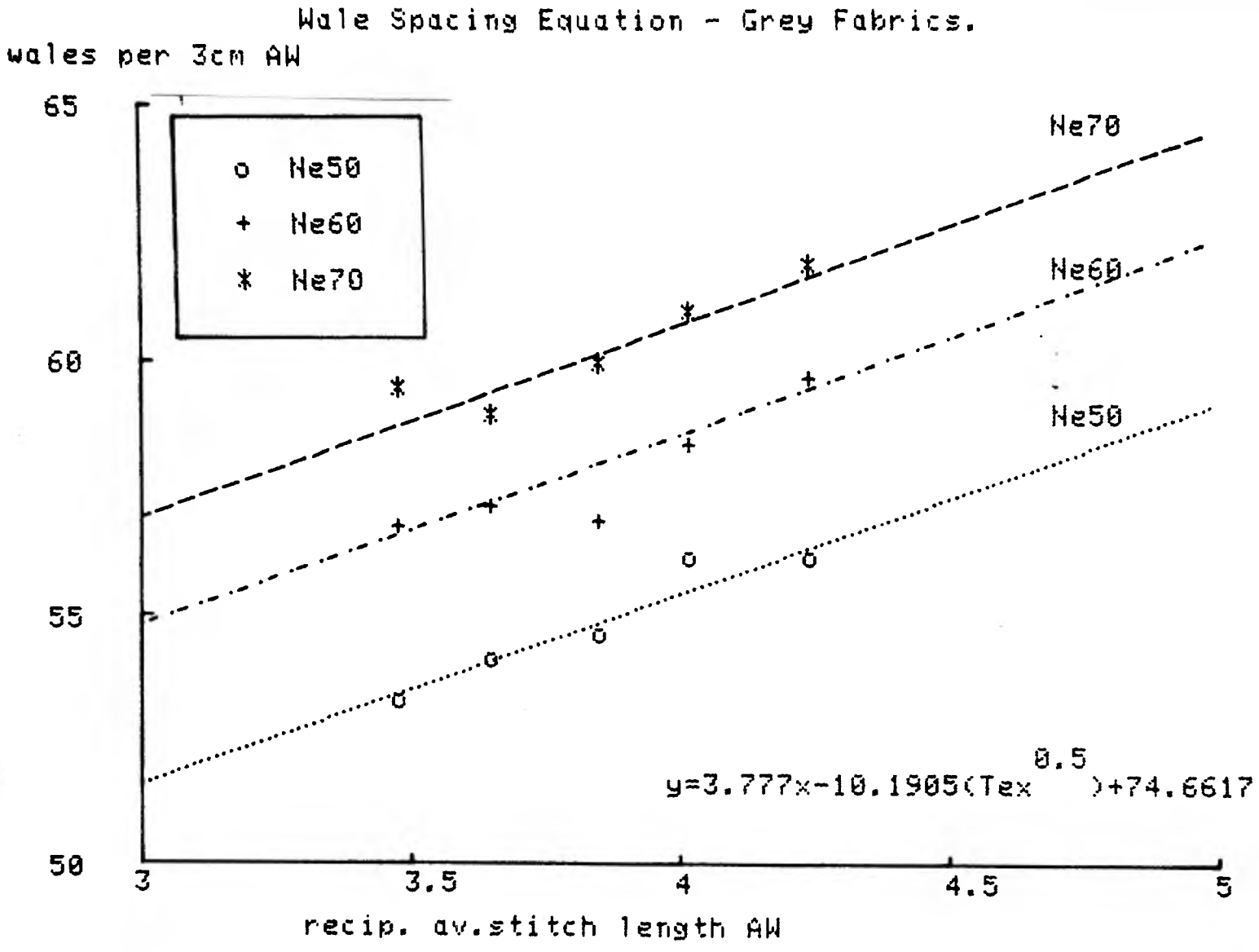

Wale Spacing Equation - Grey Fabrics.
wales per 3cm AW
65
60
55
50
o Ne50
+ Ne60
* Ne70
Ne70
Ne60
Ne50
y=3.777x-10.1905(Tex^0.5)+74.6617
3
3.5
4
4.5
5
recip. av.stitch length AW

Figure 14

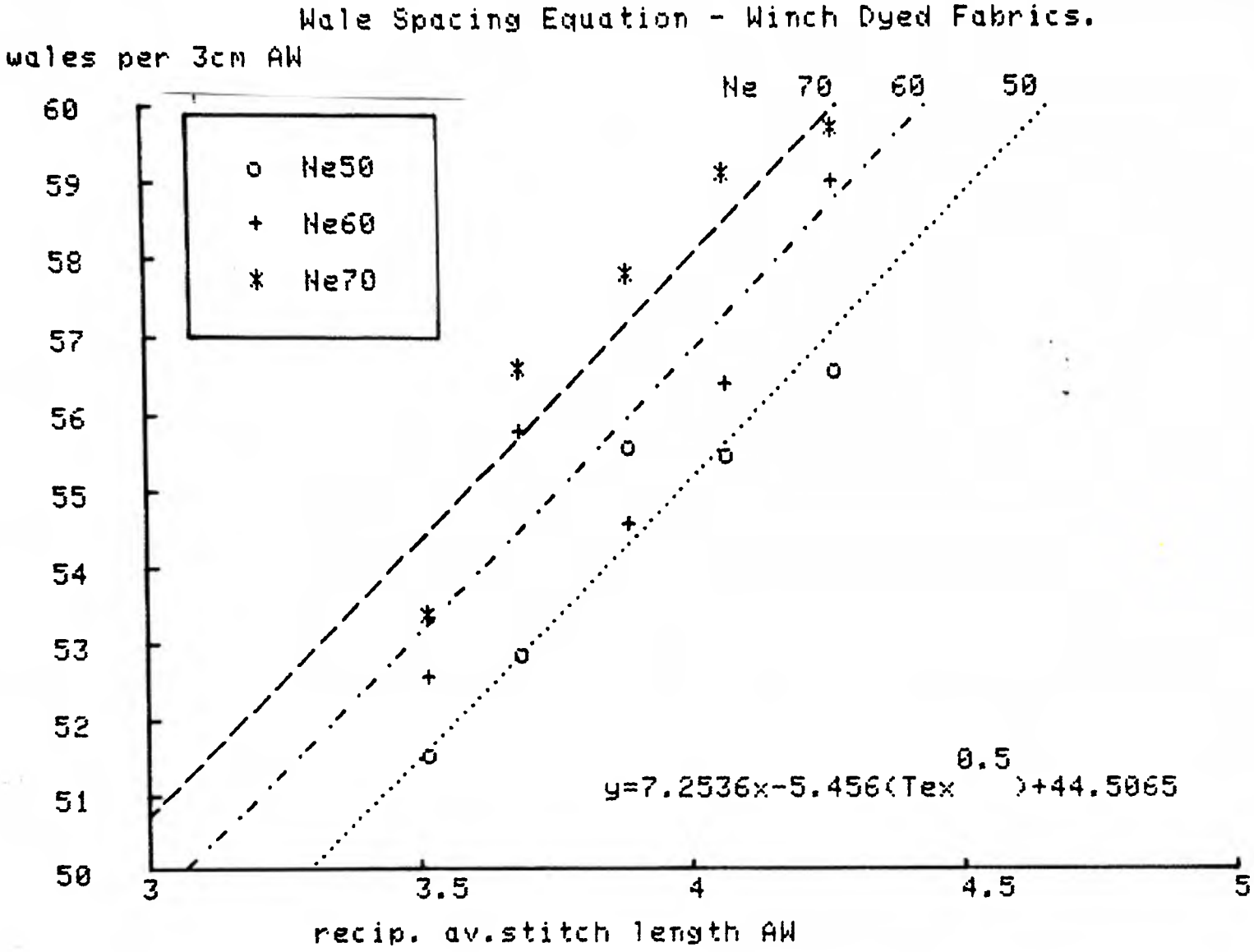

Wale Spacing Equation - Winch Dyed Fabrics.
wales per 3cm AW
Ne 70 60 50
o Ne50
+ Ne60
* Ne70
60
59
58
57
56
55
54
53
52
51
50
3
3.5
4
4.5
5
recip. av.stitch length AW
y=7.2536x-5.456(Tex 0.5)+44.5065

Figure 15

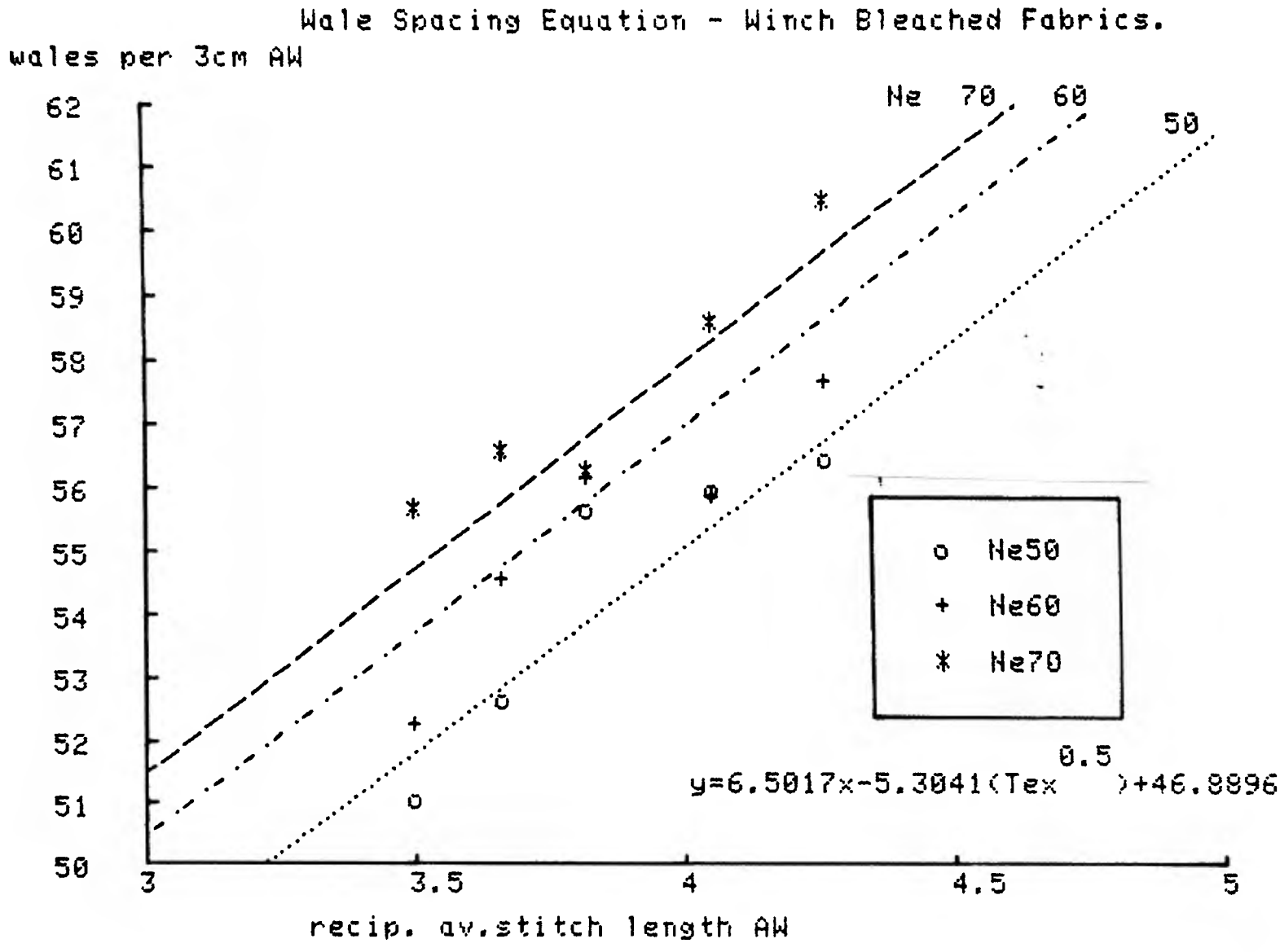

Wale Spacing Equation - Winch Bleached Fabrics.
wales per 3cm AW
62
61
60
59
58
57
56
55
54
53
52
51
50
Ne 70
60
50
o Ne50
+ Ne60
* Ne70
y=6.5017x-5.3041(Tex^0.5)+46.8896
3
3.5
4
4.5
5
recip. av.stitch length AW

Figure 16

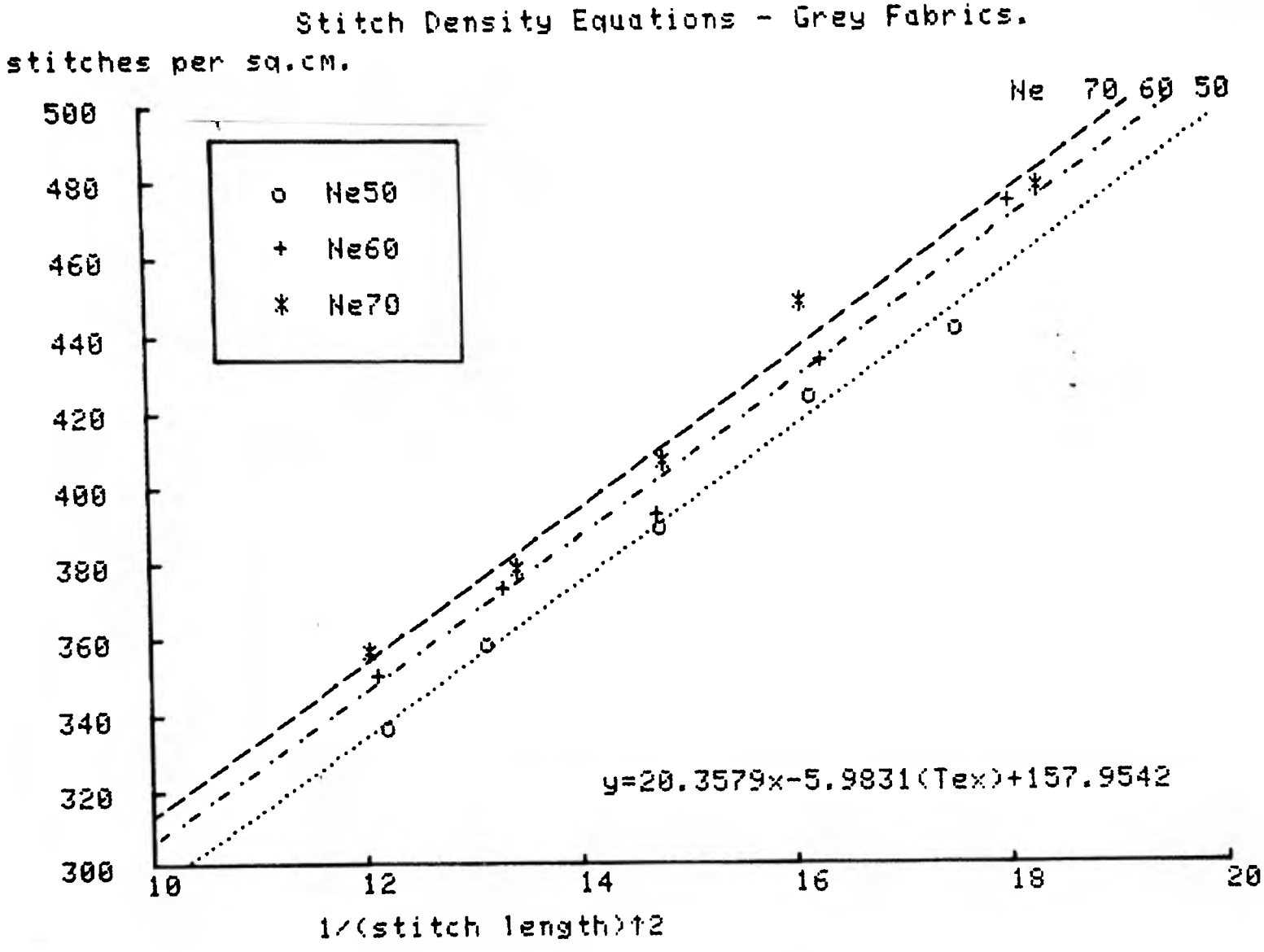

Stitch Density Equations - Grey Fabrics.
stitches per sq.cm.
Ne 70 60 50
500
480
460
440
420
400
380
360
340
320
300
o Ne50
+ Ne60
* Ne70
y=20.3579x-5.9831(Tex)+157.9542
10
12
14
16
18
20
1/(stitch length)↑2

Figure 17

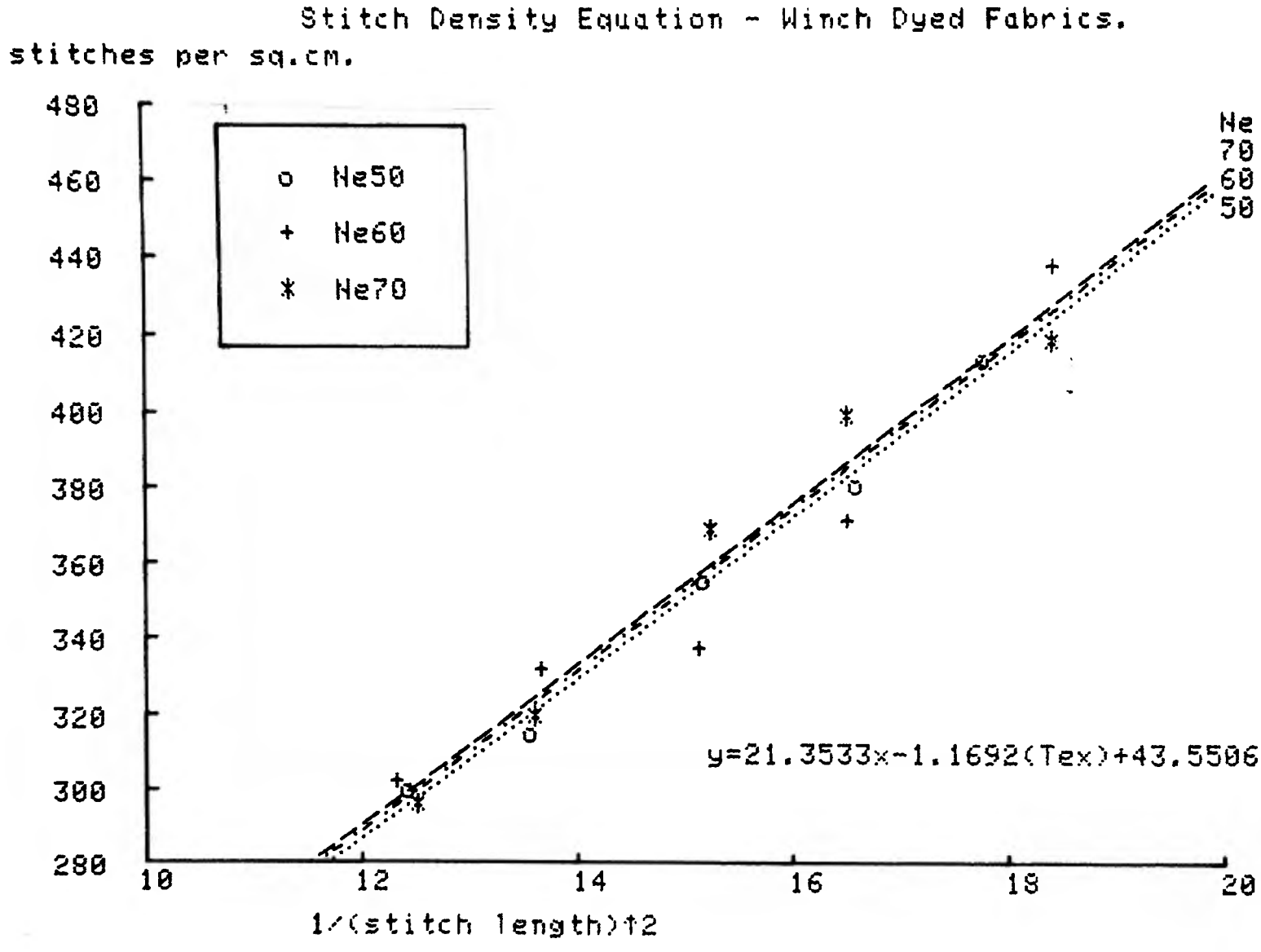
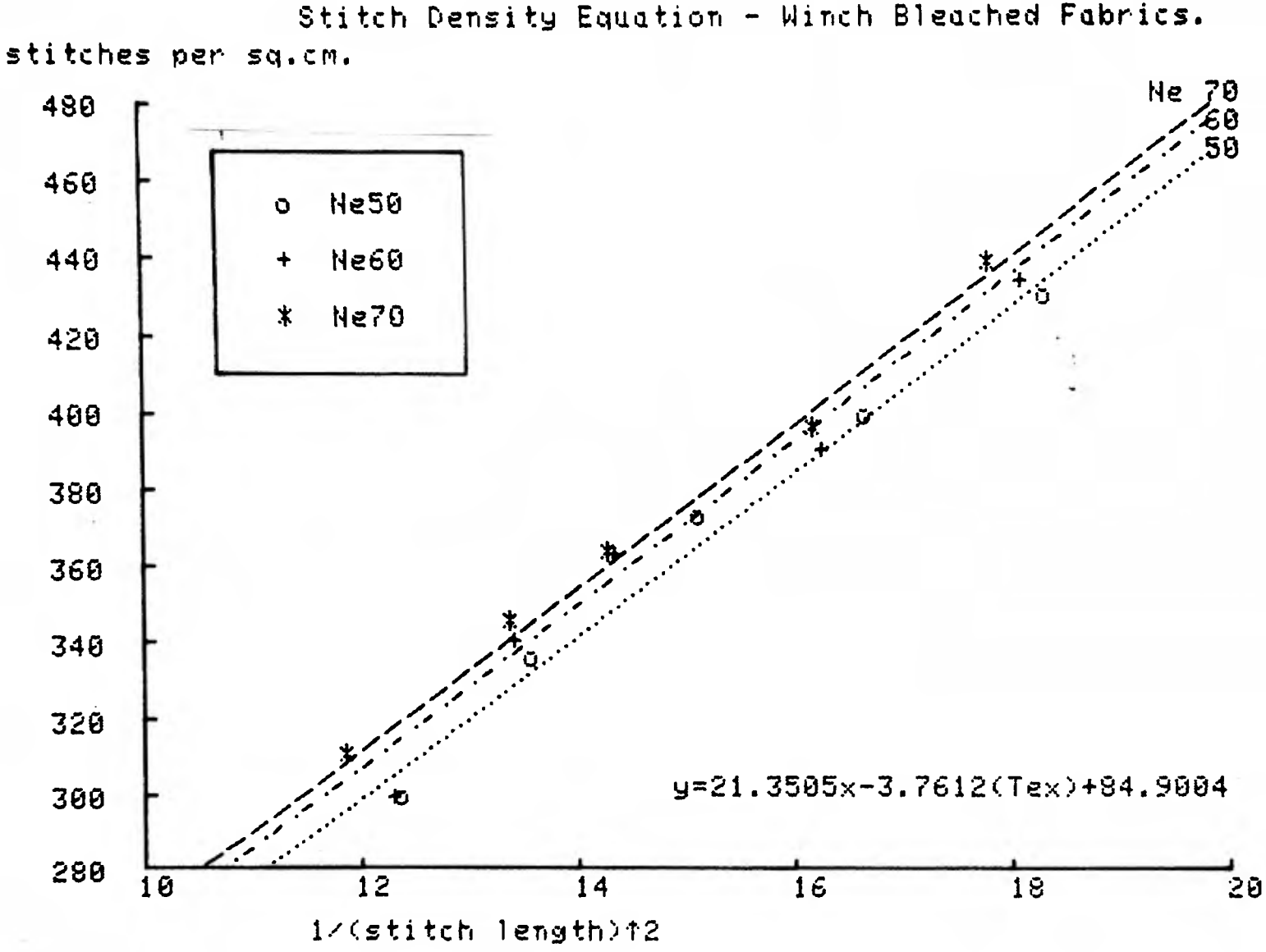

Stitch Density Equation - Winch Dyed Fabrics.
stitches per sq.cm.
480
460
440
420
400
380
360
340
320
300
280
o Ne50
+ Ne60
* Ne70
Ne
70
60
50
y=21.3533x-1.1692(Tex)+43.5506
10
12
14
16
18
20
1/(stitch length)↑2

Figure 18


Stitch Density Equation - Winch Bleached Fabrics.
stitches per sq.cm.
480
460
440
420
400
380
360
340
320
300
280
10
12
14
16
18
20
1/(stitch length)↑2
o Ne50
+ Ne60
* Ne70
Ne 70
60
50
y=21.3505x-3.7612(Tex)+84.9004