PRODUCTION OF MEDIUM COUNT COMBED
O-E ROTOR YARNS

انتاج خيوط ممشطة [illegible] الطرف المفتوح [illegible] حتى [illegible] .

by

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ملخص البحث: لظهور الاتجاهات الحديثة في مجال تصنيع ماكينات الغزل وتطويرها في مكانية ادخال عملية التمشيط وتحضير [illegible] منظومة الانتاج بنمر خيوط حتى [illegible] تحقيق الاستفادة من [illegible] حيث زيادة كفاءة التشغيل [illegible] الكيلوجرام من الخيط المنتج مع تحقيق جودة عالية للخيوط . الدراسة في هذا البحث [illegible] الطرف المفتوح الممشط [illegible] الغزل المفتوح الثقيبة [illegible] بعض المتغيرات ([illegible] وكذلك [illegible] على ثلاث مستويات بطريقة [illegible] بين نسب التمشيط ونمر الخيط [illegible] والتفاعل بينها

وتشير نتائج البحث الى [illegible] والمنتجة من نفس الخامة على [illegible] زيادة في رتب جودة الخيوط . [illegible] ولكل ساعة.

[illegible] present study , the work was carried out on an Egyptian Textile [illegible] comprehensive programme of studies was constructed , in which [illegible] combed rotor yarn in the medium count range was examined as [illegible] parameters : type of sliver, combing %,twist multiplier and [illegible] The experimental design technique (6,7) with the help of [illegible] programming used in this work to investigate the optimum con- [illegible] indicate that a new finding such as : higher yarn strength with the same cotton fiber (Giza 75) , improvement in yarn elongation and Uster C V % , better yarn quality index , less hairness and ends down .

1.Introduction

During the last 15 years , rotor spinning has under gone a head long technical and technological advance in terms of : its productivity, the level of automation, using efficient package removal systems, higher rater speeds with ever smaller rotor. all these modification opening the way for the penetration of rotor spinning into the range of fine yarn counts.

Recently, several machinery makers (1,2) succeded in prsenting a new technology aimed at producing fine yarns economically with high quality. Also several attempts using combed silver to improve the yarn quality and spinnability (3,4,5)

Because of the trand goes to combed rotor yarns with higher rotor speed and improve technological elements, there are two facts to be considered :

-Carded rotor yarns are successful in the range between metric 40 and 60, if the raw material is selected in accordance with the exacting yarn standarts (1).

-The combing technology has to enable the production of high quality yarn without the need of aspecially selected and expensive raw material by (2) :

*reducing short fiber content and fine immature fibers this results in an overall micronair increase from 0.1 to 0.2 points.

*removing impurities , this results in clear silver and less trash deposited in the rotor groove.

*parallelizing the fibers and producing an even silver also, the increase of combing and preparation production reduces the total combing costs. So it becomes possible to replace carded yarn by combed yarn with a lower percentage of comber noil.

Thus, the present work is intended to study the production of rotor yarns from combed cotton in the medium count range. The experiments carried out to investigate the effect of yarn linear desity " or spinning draft ", twist multiplier, silver preparation and combing % on the quality of combed rotor yarns.

The plan of experiments constructed by using multifactorial (for three variables) (6) and factorial design developed by box (7) (for two variables) and with the help of mini -computer programming.

In the next work , the investigation on the area of combing system in rotor spinning technology will be continiues to study the production of fine combed open-end yarns using different rotor speeds and rotor diameters.

2. Experimental work

2.1 Statistical design of experiments

Two experimental plans were designed to investigate the quality of combed rotor yarns .

i) The first : the technique of factorial design will be considered is a multi factorial experiment. The general method of analysis is drawn from the previous literature (6) of experimental design.

ii) The second : varying two variables using Box and Behnkan technique (7) for the comber noils and yarn count. The variables are selected at three levels namely (-1), (0), (+1). The response " Y " is given by a second order polynomial i.e $$Y=b_0+\sum_{i=1}^{k} b_i x_i+\sum_{i=1}^{k}\sum_{j=1}^{k} b_{ij} x_i x_j$$

where x_i : ith variable, k : number of varibles , b_0 , b_i and b_{ij} : regression associated with the variables.

2.2 Construction details of experiments :

i) In the case of three variables:

- In the first experiments three variables considered to be affecting rotor yarn quality as follows : X1 is twist multiplier (α_e) , X2 is yarn count (Ne) and X3 is sliver preparation (i.e carding and combing phase) and composed of 12 separate sampling of output (i.e 2 x 3 x 2) as shown in table (1)

- In the experiments 18 samples (2 x 3 x 3) and the variables considered to be affecting the quality are : X1 is twist multiplier , X2 is yarn count and X4 is combing noils (%) as given in table (2)

Table (1) 2 x3 x 2 Factorial Experiments

X1 twist multiplier	X 3 : Sliver Preparation					
	carding phase			combing phase		
	X 2 : yarn count (Ne)			X 2 yarn count (Ne)		
αe	14	20	26	14	20	26
3.8	x	x	x	x	x	x
4.3	x	x	x	x	x	x

Table (2) 2 x 3x 3 Factorial Experiments

X 1 twist multiplier	X 4 : Combing Noil								
	10 %			15 %			20 %		
	X 2 : yarn count			X 2 : yarn count			X 2 : yarn count		
αe	14	20	26	14	20	26	14	20	26
3.8	x	x	x	x	x	x	x	x	x
4.3	x	x	x	x	x	x	x	x	x

ii) In the case of two variables (K = 2) the experimental plan is given in table (3) and the effect of the first and second order were determined by carrying out a 3^2 factorial experiments. Also actual levels corresponding the coded variables is shown in table (4). The variables considered to effecting the rotor yarn quality are X_2 : yarn count (Ne) and X_4 : combing noils (%).

Table (3) Experimental plan for two variables

Exp.	Levels of variabl		Responce
No.	X 1	X 2	Yi
1	-1	-1	Y1
2	0	-1	Y2
3	+1	-1	[illegible]
4	-1	0	
5	0	0	[illegible]
6	+1	0	[illegible]
7	-1	+1	
8	0	+1	
9	+1	+1	y9

Table (4) Actual levels corresponding to coded variables

Factors	Levels		
	-1	0	+1
X2 : yarn count (Ne)	14	20	26
X4 : combing%	10	15	20

2.3 Material used :

The experiments were carried out using Egyption cotton fiber (Giza 75) and its properties are given in table (5).

2.4 Yarn production :

Cotton fibres were processed through the blowroom and carded at Crosrol m/c. Carded sliver was fed " Howa" combing preparation and comber m/c and Platt drawing as shown in fig (1). Rotor yarns of different counts were spun from carded and combed sliver with different twist multipliers also the combing %

selected at three levels 10%, 15% and 20%. The Schlafhorst rotor spinning m/c was set up to run at 41500 r.p.m and combing roller speed was optimized at 7200 r.p.m and delivery speed 68 m/min

Table (1) cotton fiber properties

(I) Fiber Length (using digital fibrograph)
mean length = 29 mm, S.L 2.5% = 30.5, SL at 50% = 16.2 mm
(II)Fiber Strength (Pressely tester) :
Pressely index : 10.1 lb/mg
(III) Fiber Fineness (Shiffeld micronaire)
micronaire reading 4.5 µg/inch
maturity 87%

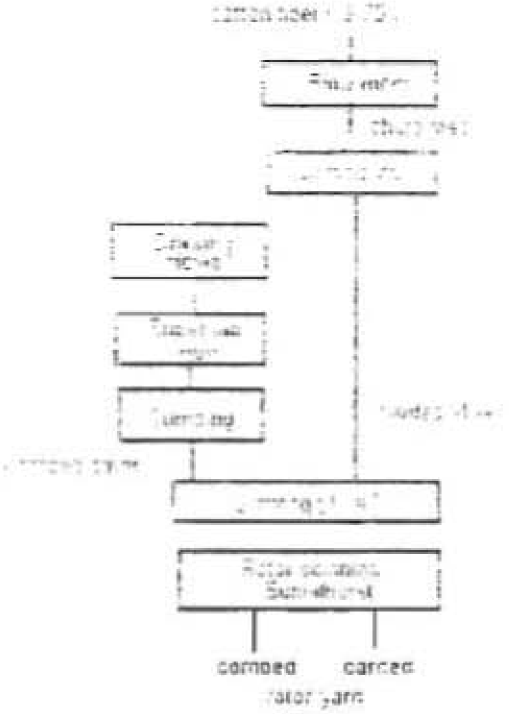

Fig (1)

2.3 Measurements of yarn properties .

The Uster Evenness Tester type III was used, the rate of traverse of the yarn being 200 m/min and the integration time 1 min. Ten packages of yarn

Table (5)

The Two-Way Table For Each Pair Of Factors

(i) yarn tenacity

αe x Ne

	Ne1	Ne2	Ne3	sum
αe1	[illegible]	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

αe x Sp

	sp1	sp2	sum
αe1	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

Ne x Sp

	Ne1	Ne2	Ne3	sum
sp1	[illegible]	[illegible]	[illegible]	[illegible]
sp2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

(ii) yarn elongation

αe x Ne

	Ne1	Ne2	Ne3	sum
αe1	[illegible]	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

αe x sp

	sp1	sp2	sum
αe1	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

Ne x Sp

	Ne1	Ne2	Ne3	sum
sp1	[illegible]	[illegible]	[illegible]	[illegible]
sp2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

(iii) yarn irregularity

αe x Ne

	Ne1	Ne2	Ne3	sum
αe1	[illegible]	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

αe x Sp

	sp1	sp2	sum
αe1	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

Ne x Sp

	Ne1	Ne2	Ne3	sum
sp1	[illegible]	[illegible]	[illegible]	[illegible]
sp2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

(iv) yarn quality index

αe x Ne

	Ne1	Ne2	Ne3	sum
αe1	[illegible]	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

αe x Sp

	sp1	sp2	sum
αe1	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

Ne x Sp

	Ne1	Ne2	Ne3	sum
sp1	[illegible]	[illegible]	[illegible]	[illegible]
sp2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

(v) yarn hairiness

αe x Ne

	Ne1	Ne2	Ne3	sum
αe1	[illegible]	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

αe x Sp

	sp1	sp2	sum
αe1	[illegible]	[illegible]	[illegible]
αe2	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

Ne x Sp

	Ne1	Ne2	Ne3	sum
sp1	[illegible]	[illegible]	[illegible]	[illegible]
sp2	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

Table ([illegible])

The Two-Way Table For Each Pair Of Factors

(i) yarn tenacity

	Ne1	Ne2	Ne3	sum
Cr1	[illegible]	742.8	[illegible]	987.90
Cr2	[illegible]	[illegible]	[illegible]	1029.1
Cr3	[illegible]	[illegible]	[illegible]	1010.5
sum	[illegible]	1046.9	[illegible]	[illegible]

	αe1	αe2	sum
Cr1	[illegible]	488.5	987.80
Cr2	[illegible]	509.1	[illegible]
Cr3	511.1	507.2	[illegible]
sum	[illegible]	1504.8	[illegible]

	αe1	αe2	sum
Ne1	[illegible]	[illegible]	[illegible]
Ne2	[illegible]	[illegible]	[illegible]
Ne3	[illegible]	[illegible]	504.3
sum	[illegible]	504.3	[illegible]

(ii) yarn elongation

	Ne1	Ne2	Ne3	sum
Cr1	[illegible]	[illegible]	[illegible]	[illegible]
Cr2	[illegible]	[illegible]	[illegible]	[illegible]
Cr3	[illegible]	178.2	116.7	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Cr1	[illegible]	247	[illegible]
Cr2	198.5	190.5	[illegible]
Cr3	199.2	170.8	[illegible]
sum	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Ne1	[illegible]	[illegible]	[illegible]
Ne2	[illegible]	[illegible]	[illegible]
Ne3	177.1	183.2	[illegible]
sum	[illegible]	[illegible]	[illegible]

(iii) yarn irregularity

	Ne1	Ne2	Ne3	sum
Cr1	[illegible]	[illegible]	302.3	[illegible]
Cr2	[illegible]	[illegible]	[illegible]	[illegible]
Cr3	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Cr1	378.2	336.4	[illegible]
Cr2	387.5	378.8	[illegible]
Cr3	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Ne1	[illegible]	[illegible]	[illegible]
Ne2	[illegible]	[illegible]	[illegible]
Ne3	400.7	424.1	828.2
sum	[illegible]	[illegible]	[illegible]

(iv) yarn quality index

	Ne1	Ne2	Ne3	sum
Cr1	[illegible]	172.77	[illegible]	[illegible]
Cr2	150.07	[illegible]	144.27	242.35
Cr3	161.98	[illegible]	144.21	[illegible]
sum	[illegible]	[illegible]	418.38	[illegible]

	αe1	αe2	sum
Cr1	240.2	240.8	474.8
Cr2	[illegible]	[illegible]	[illegible]
Cr3	283.5	243.1	[illegible]
sum	763.1	729.3	[illegible]

	αe1	αe2	sum
Ne1	[illegible]	[illegible]	[illegible]
Ne2	[illegible]	[illegible]	[illegible]
Ne3	228.4	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

(v) yarn hairiness

	Ne1	Ne2	Ne3	sum
Cr1	178.5	171.73	107.12	[illegible]
Cr2	[illegible]	[illegible]	[illegible]	[illegible]
Cr3	[illegible]	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Cr1	177.8	180.4	358.2
Cr2	[illegible]	[illegible]	[illegible]
Cr3	176.02	168.5	344.57
sum	[illegible]	[illegible]	[illegible]

	αe1	αe2	sum
Ne1	185.6	[illegible]	[illegible]
Ne2	[illegible]	[illegible]	[illegible]
Ne3	[illegible]	[illegible]	[illegible]
sum	[illegible]	[illegible]	[illegible]

were tested (i.e 2000 meter/yarn were performed, at the same time yarn imperfections were recorded.

Uster Tensomat Tester was used for measuring strength characteristics and 100 tests per yarn were preformed, each with tested length 50 cm and breaking time 20 sec. Uster yarn hairiness monitor " H " in conjunction with UT3 used for mesuring hairiness%. Zweigle automatic twist tester D302 was used for masuring yarn twist (t/m and c.v%) also zweigle automatic yarn count tester L290 was used for measuring yarn count (Tex ,Ne and c.v%)

Table (3) Summary of variance analysis of O-E combed yarn properties (2 x3 x2)

Source of Variance	Degree of Freedom (d.f.)	Mean Square (M.S.)				
		Yarn Properties				
		Tenacity cN/tex	Elongation %	Irregularity CV%	Hairiness %	YQI
(i) Main Effects						
twist factor (αe)	1	10.9324*	1.6660*	14.4977*	0.0238	3.8900*
yarncount (Ne)	2	11.7197*	4.4155*	58.2129*	0.9144*	98.240*
sliver prep.(Sp)	1	115.0521*	0.6542*	0.02050	17.3801	15.350*
(ii) Two Factor Interaction :						
αe x Ne	2	11.0685*	2.1712*	0.3884	0.5950	0.925*
αe x Sp	1	3.5501	0.1350	0.0878	1.1270	0.500**
Ne x Sp	2	1.7750	0.2138*	0.0175	1.5150	0.915*
(iii) Three Factor Interaction :						
αe x Ne x Sp	2	2.5298	0.5828	0.0882	57.720*	0.286
Within cell	108	1.4628	0.0969	0.3135	0.6330	0.129

(*) significance for 99%   (**) significance for 95%

Experimental analysis :

As shown in the experimental work in table (1-3) the results obtained for yarn tenacity,breaking elongation,yarn irregularity,yarn quality index (YQI),yarn hairiness and ends down/1000 r.h were fed to computer and regression coefficients were determined . The coefficients were tested for significance at the 90 , 95 and 99% confidence level . Also the two way table for each pair of factors is given in tables (6) and (7) . Summary of variance of open - end combed yarn characteristics are given in tables (8) and (9) *Also the responce-surface equations for the various yarn parameters are given in table (10) . Contour maps were cestrutced by using the responce surface equation as shown in figures (2) to (7) .

Table (9) summary of variance analysis of O-E yarn properties (3 x3 x 2)

Source of Variance	Degree of Freedom (d.f)	Mean Square (M S)				
		Yarn Properties				
		Tenacity g/tex	elongation E%	irregularity C.V%	hairiness (H)	(Q)
Main Effects :						
combing% (Cr	2	17.006*	0.0178	1.8802*	0.9341	5.455*
yarn count(Ne)	2	21.604*	5.098*	92.396*	9.2852*	78.95*
twist factor(αe)	1	0.59	0.7195	7.6471*	0.1367	6.34*
(II) Two - Factor Interaction:						
Cr x Ne	4	6.664*	0.0306	0.6988**	0.465	1.050
Cr x αe	2	1.409	0.4887	0.2800	1.128	3.375*
Ne x αe	2	16.286*	2.534	0.8566**	0.903	15.040*
(III) Three - Factor Interaction						
Cr x Ne x αe	4	3.102**	18.833*	9.04995	1.54	3.140
Within cell	162	1.148	0,538	0.2287	0.486	0.678

(*) significance for 99% (**) significance for 95%

4 . Results and discussion

4.1 Yarn tenacity

The yarn tenacity results due to the effect of the three variables linear density, twist factor and combing % are shown in table (7) it can be noticed from the variance analysis that the main effect of the factors is significant . Also

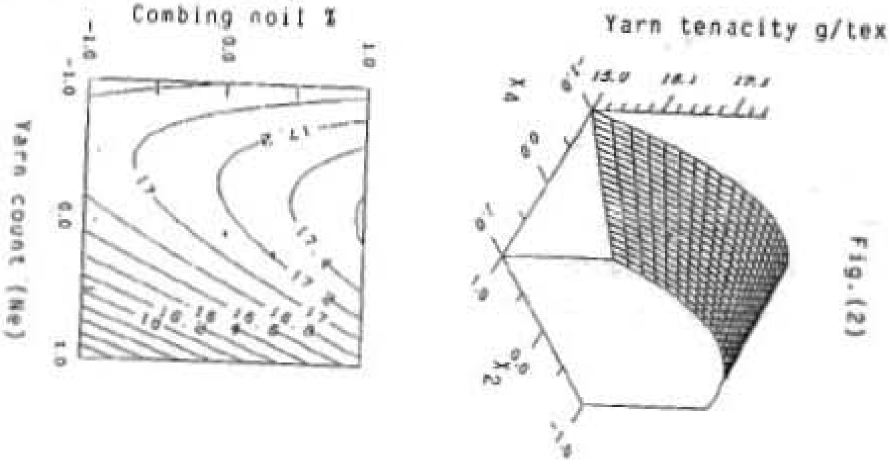

Fig.(2)

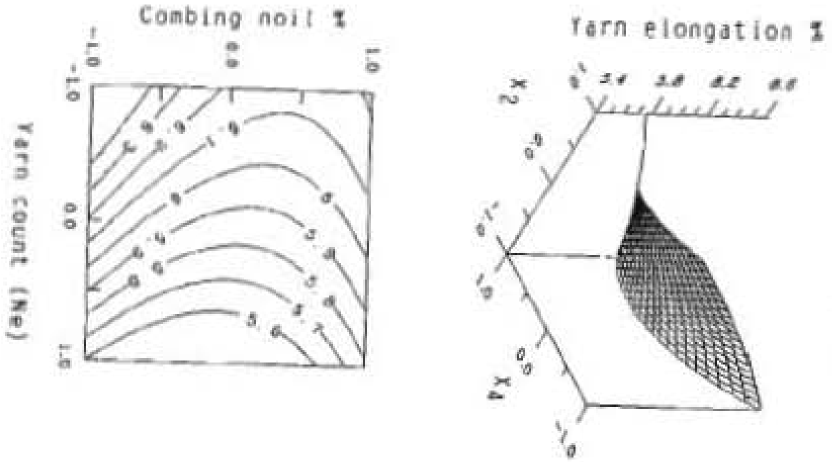

Fig.(3)

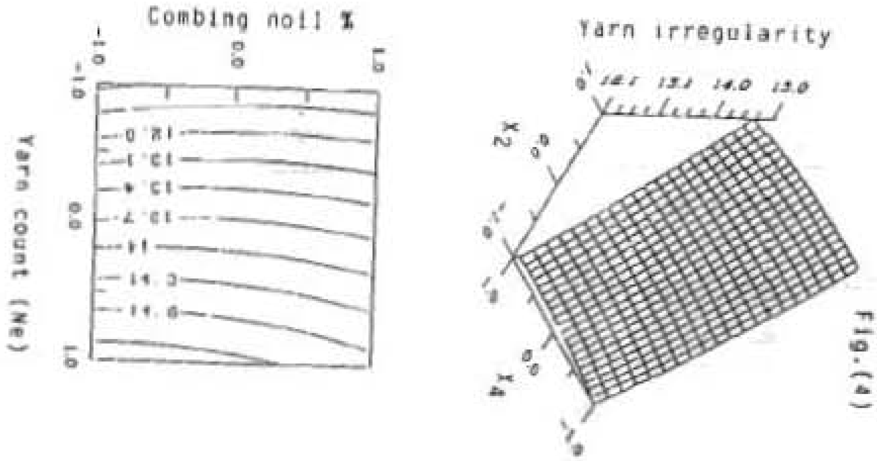

Fig.(4)

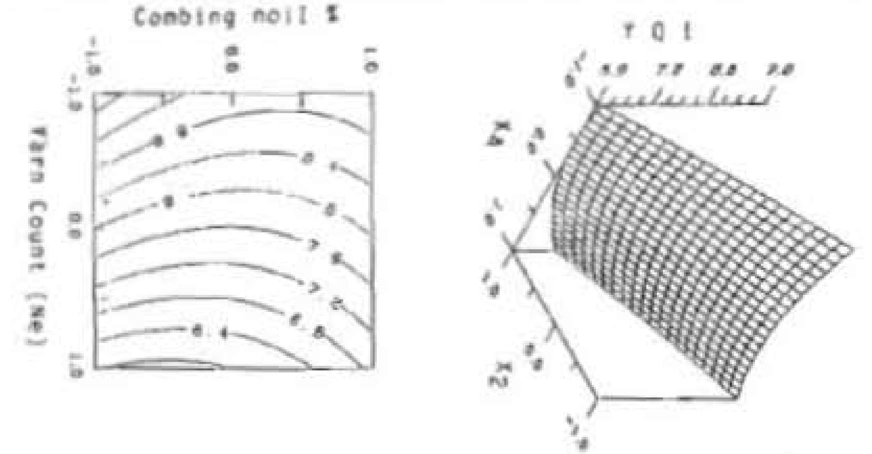

Fig. (5)

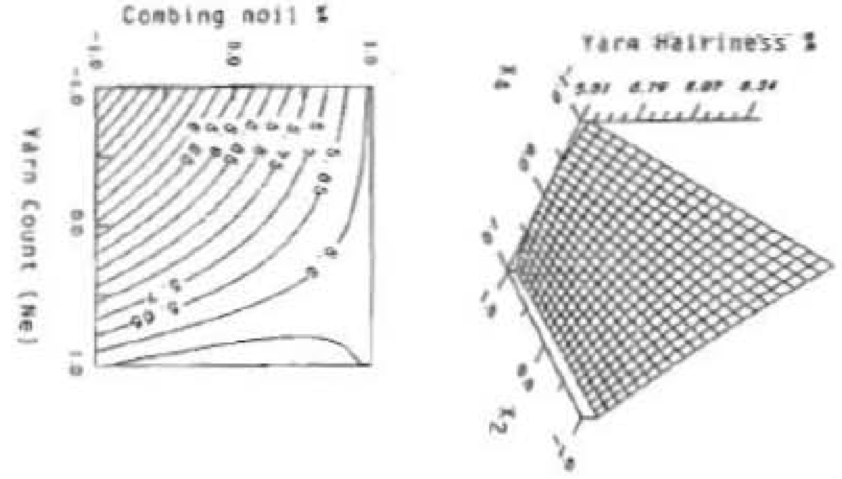

Fig. (6)

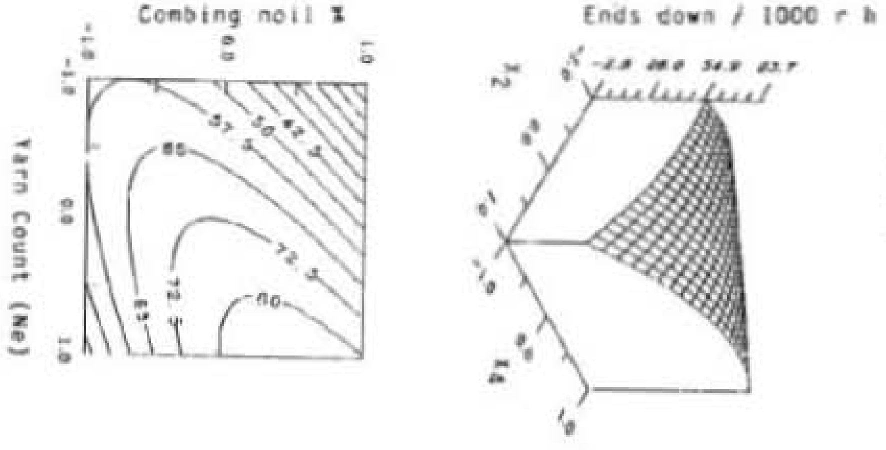

Fig. (7)

the interaction between yarn linear density and twist multiplier is highly significant. From the two way tables, it can be seen that the linear density has a significant influence on the yarn tenacity, as yarn becomes finer this leads to a drop in yarn

Table (10) Responce-Surface Equations

Responce	Responce-Surface equation	Correlation coefficient
(i) yarn tenacity (g/tex)	$17.37-0.480\bar{X}_1+0.475\bar{X}_2-0.830\bar{X}_1^2$ $+0.000\bar{X}_2^2+0.398\bar{X}_1\bar{X}_2$	0.920
(ii) yarn elongation (E%)	$5.360-0.078\bar{X}_1-0.07\bar{X}_2-0.056\bar{X}_1^2$ $+0.291\bar{X}_2^2-0.156\bar{X}_1\bar{X}_2$	0.949
(iii) yarn irregularity (CV%)	$12.749+1.35\bar{X}_1-0.056\bar{X}_2-0.120\bar{X}_1^2$ $-0.067\bar{X}_2^2-0.120\bar{X}_1\bar{X}_2$	0.939
(iv) yarn quality index (YQI)	$7.580-1.610\bar{X}_1+0.036\bar{X}_2-0.307\bar{X}_1^2$ $+0.460\bar{X}_2^2+0.110\bar{X}_1\bar{X}_2$	[illegible]
(v) yarn hairiness (H%)	$5.74-0.220\bar{X}_1-0.206\bar{X}_2-0.0034\bar{X}_1^2$ $+0.0420\bar{X}_2^2+0.205\bar{X}_1\bar{X}_2$	0.790
(vi) ends down per 1000 [illegible]	$72.216+16.86\bar{X}_1+4.186\bar{X}_2$ [illegible]	[illegible]

( ) note $\bar{X}_1$ = X2 [illegible] $\bar{X}_2$ [illegible]

yarn tenacity . Also the twist multiplier effect has been observed. The higher twist especially at finer count resulting in a reduction in tenacity values . On the other hand , the influence of sliver fed can be noticed . The results indicate that a higher yarn tenacity as combed sliver fed than those obtained for carded sliver table (5) . The contour lines for yarn tenacity due to the effect of combing % and yarn linear density is shown in fig (2), and the complete analysis of variance are given in table (9) . It can be seen , for yarn having a higher linear density , the effect of combing % within the experimental field results in a slight change in yarn tenacity . While , when the yarn becoms finer that the improvement influence of the combing % on the yarn tenacity can be observed . An increase in combing % increased the rotor yarn tenacity by approximately 12%

4.2 Elongation at break

The two way tables (6 - 7) indicate that, the elongation at break is influenced by twist multiplier . Also, the effect of the factor (twist and linear density) and three factor (twist x linear density x sliver fed) is highly significant (table 8) . From the complete variance anlysis given in table 9 , it is clear that the three factor (combing % x linear density x twist) affect significantly on yarn elongation . Also the yarn elongation is affected by other factors than by combing % . The responce surface for elongation at break (fig. 3) indicates the influence of yarn linear density and combig % . The reduction in yarn elongation values is more marked for finer yarn and within the practical range of combing % . While a higher elongation corresponds to lower combing % and coarser yarn .

4.3 Yarn irregularity

As can be observed in two way table (6 - 7) for low and high twist levels,regularity of O-E yarn is practically dependent of the yarn linear density . For both high twist and finer yarns an increase in irregularity does become evident

For the type of sliver fed (carded and 15% combed), the results obtained imply that;as combed sliver was used for spinning combed rotor yarns results in a slight change of regularity values .

Figure (4) shows the effect of yarn linear density and combing % on yarn irregularity . The contours clearly show that, their regularity increases with a decrease in yarn linear density . For finer count as the combing % increases, the influence on regularity becoms more apparent . The combing process gives a little improvement in the Uster c.v% as shown in table (7) .

4.4 Yarn quality index (YQI)

Two way tables (6 -7) show the influence of yarn linear density, twist factor, sliver fed and combing % on combed yarn quality index . As we have seen, the results that just been analysed are affected by the combing process . a better yarn quality is obtained with combed sliver than with cardedd sliver .

Also, it is evident that yarn quality index is affected by twist multiplier . The best results are obtained for low twist . For high yarn linear density, varying twist multiplier causes a slight differences in combed yarn quality . While the difference is approximately 1.3 points for finer count . It follows from this that, as the yarn becomes finer it is appropriata to use a lower twist multiplier

Figure (5) shows the contours for yarn quality index, due to the effect of combing % and yarn linear density . The results indicate that, quality index decreases from coarse to fine yarns . Also quality index is slightly deteriorate with an increase in combing % for coarser counts .The inverse phenomenan is observed for finer count, an increase in combing % results in an increase in yarn quality index .

4.5 Yarn hairiness :

Hairiness is highly affected by the experimental conditions . Also, the interaction between twist, yarn linear density andd combing % is significant .

The response surface equation for rotor yarn hairiness indicates that, the combing % and yarn linear density affect yarn hairiness . Yarn hairiness decreases with increasing combing % and decreasing yarn linear density as shown in fig. (6)

4.6 Ends down :

The contour lines for ends down of combed rotor yarns is shown in fig. (7). Ends down per 1000 r.h decreases with an increasein both combing % and yarn linear density . A maximum yarn ends down occurs with finer count and high combing%. In general, ends down varies between 12 an 80 per 1000 rotor hour . This rate is very closer to the average levels of ends down in a new modern rotor installation ~ 40 per 1000 r.h for average count (Ne 27) of 22 tex

5- Conclusion :

The present study permits the following conclusion to be drawn :

1-The effect of combing % on rotor yarn quality :

(i)- Combed rotor yarn strength and the variation in strength are improved when using combed sliver .

- As a result of combing the rotor yarn tenacity increase by approximately 12%
- The effect is highly significant and it is evident for finer than for coarser counts.

(ii) Rotor yarn elongation is influenced more by combed sliver than by carded sliver.In addation,the effect due to the variation in comber noil % is less than other factors. While the interaction between combing % with yarn linear density and twist affect significantly on yarn elongation .

(iii)- Rotor yarn eveness affected significantly by the combing process . The combed sliver gives a slight improvement in the Uster c.v% . This influence is evient for finer count as the combing % increases .

(iv)-Quality Index of combed rotor yarns is slightly deteriorated with an increase in combing % for coarser counts . The inverse phenomenon is observed for finer count .

(v)- Rotor yarn hairiness decreases with an increase in combing % . The two factor (count x combing %) and three factor (count x combing % x twist) interaction affect significantly yarn hairiness .

(vi)-Ends down per 1000 rotor hour decreases with an increase in combing %

2- Effect of twist and yarn linear density on quality of combed rotor yarn . The results obtained through the experiments in this paper are sufficiently coherent to be indicateve of the trends to be expected and compitable so far with the earlier research work (8) .

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