Mansoura Engineering Journal

Volume 16 | Issue 1 Article 31

5-1-2021

Control of Noils and Fiber Length Parameters in Cotton Combers.

R. El-Bealy
Associate Professor., Textile Engineering Department., Faculty of Engineering., El-Mansoura University., Mansoura., Egypt.

M. El-Messiery
Professor of Textile Engineering Department., Faculty of Engineering., El-Mansoura University., Mansoura., Egypt.

Recommended Citation
El-Bealy, R. and El-Messiery, M. (2021) "Control of Noils and Fiber Length Parameters in Cotton Combers.," *Mansoura Engineering Journal*: Vol. 16 : Iss. 1 , Article 31.
Available at: https://doi.org/10.21608/bfemu.2021.170353

CONTROL OF NOILS AND FIBER LENGTH PARAMETERS IN COTTON COMBERS

By

R. A. El-Bealy* and M. El-Messiery**

* Associ. Prof. Textile Dept., Faculty of Engineering, Mansoura University, El-Mansoura, Egypt.

** Prof., Textile Dept., Faculty of Engineering, Alexandria University, Alexandria, Egypt.

التحكم فى نسبة عوادم التمشيط وتوزيع طول شعيرات القطن فى شريط التمشيط

الخلاصة : يهدف البحث الحالى الى تحليل تأثير بعض عوامل التشغيل بماكينة التمشيط على التحكم فى نسبة العوادم المستخرجة وتحسين درجة أنتظام طول شعيرات القطن فى الشريط الناتج ، وتتركز التجارب فى دراسة تأثير ضبط المشط العلوى ، طول الملف المغذى كل دورة تمشيط وزن وحدة الطول للملف المغذى والمسافة بين المنجلتين وسلندرات القطع والوصل ، وقد صممت التجارب بتغيير عاملين عند عدة مستويات مختلفة مع ثبات بقية العوامل الاخرى "طريقة بوكس(١١) ، كذلك بتغيير ثلاثة عوامل عند ثلاث مستويات "طريقة بوكس وبنيكان(١٢) وتشير نتائج البحث الى : الحصول على أسطح الاستجابة التى تمثل العلاقة بين كل من نسبة عوادم التمشيط، أنتظام طول الشعيرات فى الشريط الناتج والعوامل التكنولوجية السابقة ، كذلك أمكن تحديد التأثير المعنوى لكل متغير على حدة والتفاعل بين كل عاملين وثلاث عوامل على درجة التمشيط .

ABSTRACT- A study was made on the effect of the comber variables, top comb depth, feed length/nip, comber lap weight and setting between detaching roll and nippers on the comber waste and fiber length parameters of combed sliver. The experimental design technique (11, 12) with the help of mini-computer programming used in this work to investigate the optimum condition. The results led to the relative importance of factors which affect the noils, 2.5% span length, 50% span length and length uniformity ratio (UR%).

1- INTRODUCTION :

The accepted main functions of combing are generally stated as following :
The removal of short fibers. Neps and waste particles are also separated from the long fibers in the combing process.
The paralization of the fibers and the uniform of the fiber strand, consequently these fibers will process better at the spinning frame.

In reviewing the literature, it was found that :

Morton and Nield (2) showed that the waste extracted by the comber of fixed settings, decreased with the decrease in the number of trailling hooks in the lap fed. Other research workers (1, 2, 3, 4) have studied the effect of hooks on noil losses and their findings are either similar or contradictory to the findings by Morton and Nield. Results published by Wilhelm and Wagner (4) indicated that the waste at the comber decreased steadily with additional machines and with higher total draft i.e. increased fiber parallization between carding and combing. Cauble (1) reported that, there is a progressive decrease in comber waste as the number of passages of drawing in the preparatory sequence was increased from one to three.

Nutter and Slater (3) studied the effect of the direction of presentation of hooked fibers and draft employed between carding and combing on comber waste, at two step gauge settings. Wakhankar and Bhaduri (5) studied the effect of fiber configuration in the feed to the comber on the waste extracted at different step gauge settings and with different cottons.

During the past twinty years considerable advances have been made by machinery manufacturers in regard to combing equipment. The advanced designing and engineering technique of new comber machines tends to:

- ensure the production of the best quality sliver and high speed operation.
- ensure better combing efficiency and staple operation, to prevent the intrusion of dust and fly.

Methods of increasing comber production rate by altering the weight of lap, feed length or machine speed have been examined and data presented to show that increased speed is technologically superior to the other alternatives (6). New comber machines capable of speed up to 340 nips/min are now offered by several makers (10) and production rates have been markdly increased up to 60 Kg/hr/m/c. Attention has also been given to methods of preparation for combing (7) and machines with high speeds have became available (8, 9).

Thus, the work reported in this paper is intend to study the effect of multi-comber parameters on strand quality using factorial design and with the help of mini-computer programming.

2- EXPERIMENTAL WORK :

Two factorial plans were designed to investigate the comber noil extracted and fiber length uniformity of comber sliver :

(i) The first, varying two parameters using Box (11) technique for:
The effect of top comb depth and feed length/ nip, and
The nifluence of comber Lap weight and setting between detaching roll and nipper.

(ii) The second, varying three factors using Box and Behnken (12) technique for the effect of comber lap weight, feed length/nip and comber noil%.

2.1 Factorial Design :

The variables are selected at three levels namely (- 1), (0) and (+ 1). The response "Y" is given by a second order polynomial i.e.

$$Y = b_o + \sum_{i=1}^{K} b_i X_i + \sum_{i=1}^{K} \sum_{j=1}^{K} b_{ij} X_i X_j$$

where X_i = i^{th} variable

K = number of variables and

b_o , b_i and b_{ij} : Regression coefficients associated with the variables.

In order to determine the regression coefficients, the response "Y" has to be found by using different experimental combinations of the variables under considerations. In case of two variables, the experimental design of Box (11) applied to find the level of the factors which give an optimum response. Also, the design developed by Box and Behnken (12) for three variables was applied in the present study to optimize the combing process parameters.

2.2 Material used :

The experiments were carried out using Egyptian cotton fiber "Giza 70" and its properties are given in Table (1).

Table (1) : Cotton fiber properties.

Fiber length:	Fiber strength:
mean length = 29 mm	pressely index = 10.8
% short fibers = 6.6%	fiber tenacity = 31.6 gf/tex
	elongation = 5.2%
Fiber fineness:	Trash content:
micronaire = 2.9 µg / inch	Lint % = 94.5%
marturity = 68%	non lint% = = 5.7%

2.3 construction details of experiments:

(i) In case of two variables (K = 2): the experimental plan is given in Table (2) and the effect of the first and second order were determined by carrying out a 3^2 factorial experiment.

Two experimental plans were designed as follows:

- The first to investigate fiber length characteristies of combed sliver and waste extraction at comber for the effect of top comb depth and feed length/nip as shown in table (3).

Table (2): Experimental plan for two variables

No.	levels of variables X_1	X_2	(Y_i)
1	-1	-1	Y_1
2	0	-1	Y_2
3	+1	-1	.
4	-1	0	.
5	0	0	Y_5
6	+1	0	.
7	-1	+1	.
8	0	+1	.
9	+1	+1	Y_9

Table (3) Actual levels corresponding to coded variables.

Factors	Levels -1	0	+1
X_1: top comb depth	0	0.5	1
X_2: feed length/nip	4.91	5.24	5.61

- The second experimental plan was designed for comber lap weight, and setting between nipper and detaching roll at different levels. The true levels of the variables are given in Table (4).

(ii) In case of three variables (K = 3), the experimental plan is given in Table (5) and the actual levels of the variables are given in Table (6). The variables considered are the comber lap weight, feed length/nip and pereentage of comber noil. The experimental work was conducted on conventional combing preparation system "card, sliver lap, ribbon lap and followed by high production comber machine". The cotton fibers processed according to the above construction details, while all other setting were kept as per reeommendations of machine manufacturers.

Table (4) Actual levels corresponding to coded variables.

Factors	-1	0	+1
X_1: setting between detach. roll and nippers (m m)	5	7	9
X_2: Comber lap weight (g/m)	55	60	65

Table (5) Experimental plan for three variables.

Combination No.	Levels of variables X_1	X_2	X_3	Response "Y"
1	-1	-1	0	Y_1
2	-1	+1	0	Y_2
3	+1	-1	0	.
4	+1	+1	0	.
5	-1	0	-1	.
6	-1	0	+1	.
7	+1	0	-1	.
8	+1	0	+1	.
9	0	-1	-1	Y_8
10	0	-1	+1	.
11	0	+1	-1	.
12	0	+1	+1	.
13	0	0	0	.
14	0	0	0	.
15	0	0	0	Y_{15}

Table (6) : Actual levels corresponding to coded variables.

Factors			
X_1: Comber lap weight (g/m)	55	60	65
X_2: Feed length/nip (m m)	4.91	5.24	5.61
X_3: Comber noil (%)	12	16	20

2.4 Measurements:

In all the above trails, the following tests were conducted on:

- Measuring the fiber length distribution, using Digital fibrograph, of raw cotton, carded sliver, comber lap, combed sliver and comber waste.
- Estimate the comber noil pereent and
- Measuring the sliver count and irregularity using Autosorter and uster evenness tester.

3- RESULTS AND DISCUSSION:

According to the experimental plans in Tables (2) and (5) the results obtained for fiber length characteristics and comber noil%. The results were fed into a mini-computer, equipped with a plotter, in order to obtain regression coefficients, the response surface equations and other statistical data as shown in Tables (7 - 9). The variance analysis was carried out to demonstrate the significanee of the variables comparing with F-table at 99, 95 and 90% significance levels as shown in Table (10). The contours for fiber length and comber waste extraction were constructed by using the response surface equations.

3.1. Effect of top comb depth and feed length/nip:

(1) comber noil extraction: as shown in Fig. (2), it is clear that in the absence of the top comb ($X_1 = -1$) there is a considerable fall in the level of comber noil extracted by the comber. This is lower than those obtained at conventional combing ($X_1 = 0$).

Table (7): Equations of Response Surface.

Comber variables	Strand parameter	Equation of Response Surface
(X_1) Top comb depth (X_2) Feed length/nip	(i) Comber noils	$C\% = 11.8268 + 3.9466\ X_1 - 1.08\ X_2 + 0.3398\ X_1^2 + 0.6599\ X_2^2 + 0.345\ X_1 X_2$
	(ii) Fiber length	$SL\ 2.5\% = 31.9967 + 0.275\ X_1 - 0.685\ X_2 + 1.3349\ X_1^2 + 0.1749\ X_2^2 + 0.0225\ X_1 X_2$
		$SL\ 50\% = 17.626 + 0.1017\ X_1 + 0.0733\ X_2 - 0.0683\ X_1^2 + 0.7767\ X_2^2 + 0.1525\ X_1 X_2$
		$UR = 55.119 - 0.144\ X_1 + 1.358\ X_2 - 2.4556\ X_1^2 + 2.076\ X_2^2 + 0.397\ X_1 X_2$

Table (8): Equations of Response Surface

Comber Variables	Strand Parameters	Equation of Response Surface
(X_1) Setting between detaching roll and nipper	(i) Comber noil	$C\% = 14.4 + 3.683\ X_1 + 1.3\ X_2 + 1.05\ X_1^2 + 0.0\ X_2^2 - 0.7\ X_1 X_2$
(X_2) Comber lap weight	(ii) Fiber length	$S.L\ 2.5\% = 33.499 + 1.1166 X_1 + 0.1833\ X_2 + 0.0168\ X_1^2 + 0.85\ X_2^2 + 0.025\ X_1 X_2$
		$S.L\ 50\% = 18.943 + 0.95\ X_1 + 0.75\ X_2 - 0.1167\ X_1^2 + 0.7835\ X_2^2 - 0.5\ X_1 X_2$
		$UR = 56.199 + 0.9\ X_1 + 1.866\ X_2 - 0.399\ X_1^2 + 1.4\ X_2^2 - 1.575\ X_1 X_2$

Table (9) Equations of Response Surface.

Comber Variables	Strand Parameters	Equation of Response Surface
(X_1) Comber Lap weight (X_2) Feed length/nip (X_3) Comber noils%	Fiber length	$S.L\ 2.5\% = 34.3866 + 0.2025\ X_1 - 1.3968\ X_2 + 0.6638\ X_3\ 0.0758\ X_1^2 - 1.4483\ X_2^2\ 0.128\ X_3^2 - 0.5525\ X_1 X_2 - 0.2825\ X_1 X_3 - 1.230\ X_2 X_3$

Fiber length $S.L\ 50\% = 20.4133 + 0.0875\ X_1 - 0.5688\ X_2 + 0.6813\ X_3 - 0.3129\ X_1^2 + 0.149\ X_2^2 - 0.8254\ X_3^2 - 0.350\ X_1\ X_2 + 0.25\ X_1\ X_3 - 0.2375\ X_2\ X_3$

Fiber length $UR = 59.437 - 0.0888\ X_1 + 0.825\ X_2$ $0.9538\ X_3 - 0.6338\ X_1^2 + 2.9842\ X_2^2 - 2.3778\ X_3^2 - 0.1024\ X_1\ X_2 + 0.585\ X_1\ X_3 + 1.6625\ X_2\ X_3$

Table (10) : Significance levels

Exp.	Variables	Mean sum of squares (m. s. s.)		
		Comber noils	Fiber length parameters: S.L 2.5%	UR%
1st plan	X_1: top comb depth (mm)	93.4571*	3.564**	0.3902
	X_2: feed length/nip (mm)	6.9984**	2.8154**	9.830***
2nd plan	X_1: Setting between detaching roll and nippers.	81.4016*	7.4816***	4.860
	X_2: Comber lap weight (g/m)	10.14**	0.2016	20.906***

Significance levels: (*) 99%, (**) 95%, (***) 90% .

The effect of stop comb on comber waste was explained by the fibers held by detaching rollers can drag forward into the sliver not directly held. Also, in the absence of the teasing action of the top comb, the action of the cylinder becames less efficient.

The contour lines indicate the effect of feed length/nip (X_2) on the comber noils. The variation in feed length/nip cause an increase, about 2%, in comber waste. Also, it can be seen that, the reduction obtained in comber noil due to the removal of top comb is greater with longer feed lengths, while a sharp increase in comber waste extraction oceurs with high comb depth and shorter feed length.

(2) Fiber length characteristics: Figure (1) show the fiber length distribution using digital fibrograph of cotton lap, card sliver, comber sliver and comber noils. It can be seen that combing removes a large proportion of the short fibers, resulting in a combed sliver whieh has a longer fiber mean length than befor combing.

The curves, in Fig. (3.1), shows the effect of top comb depth and feed length/nip on fiber length parameters. The contour lines of span length at 2.5% are ellipses with a minimum falling outside the experimental field. The contour clearly show that SL 2.5% decreases with an increase of feed length/nip.

Figures (3.2) and (3.3) clearly illustrate the trends of fiber length at span length 50% and uniformity ratio as a function of X_1:

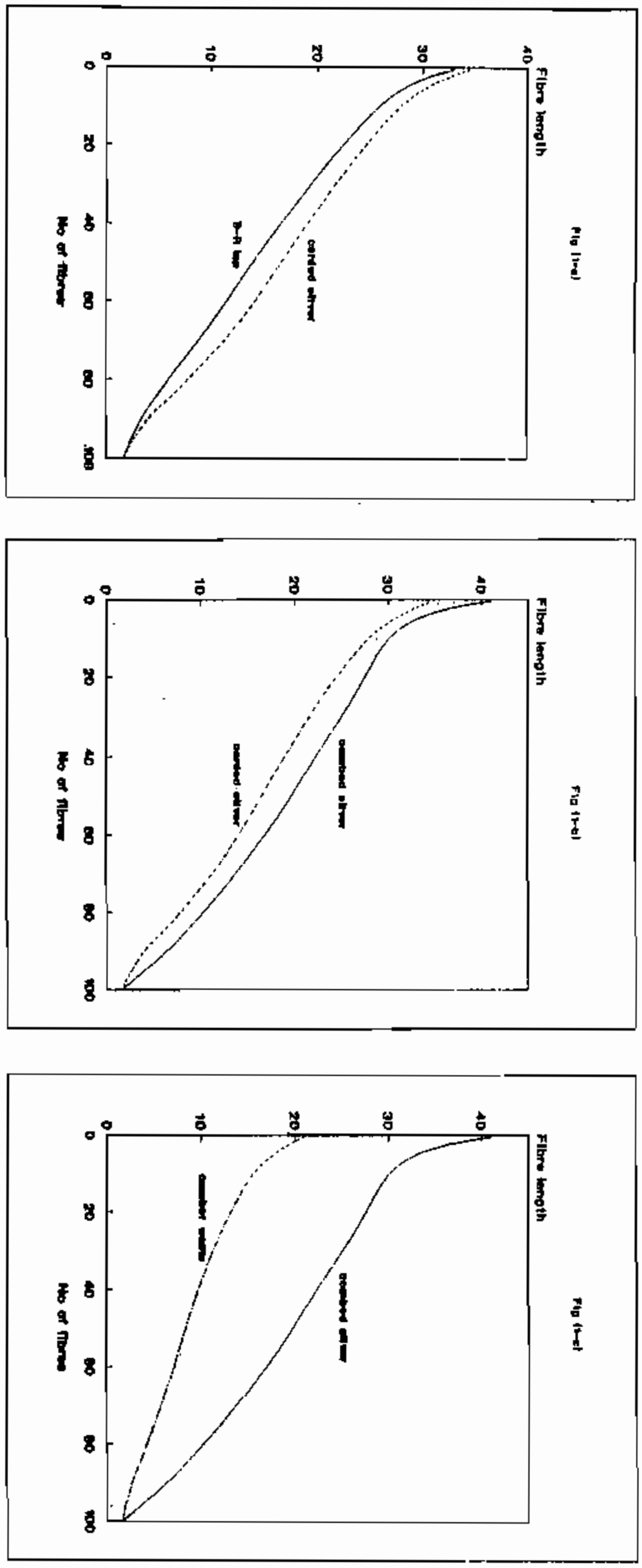


Fig. (1) Fiber Length distribution.

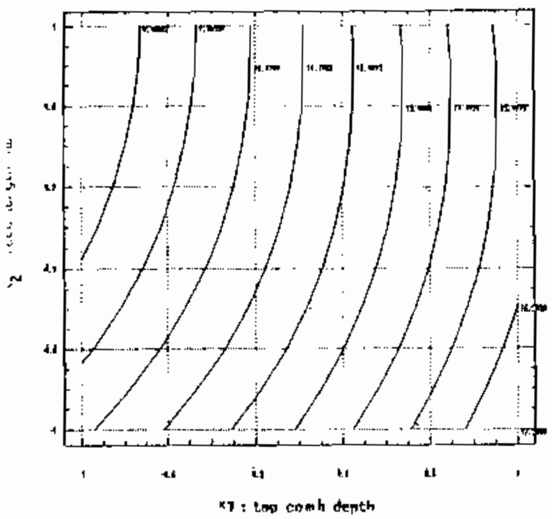


Fig. (2) Effect of top comb depth and feed length/nip on comber waste Extraction .

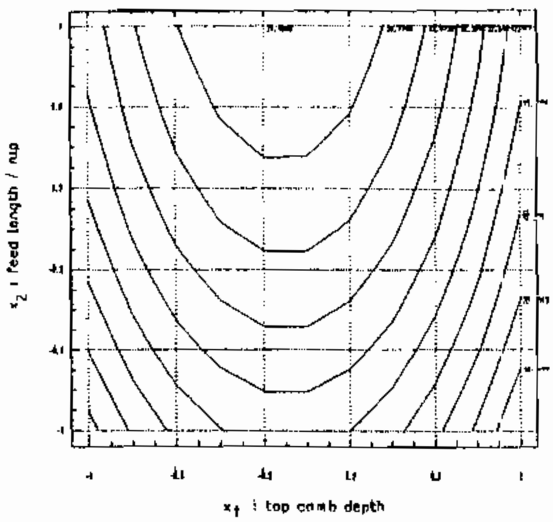


Fig. (3.1) Contours for. 2.5 % span length (2.5% S.L) .

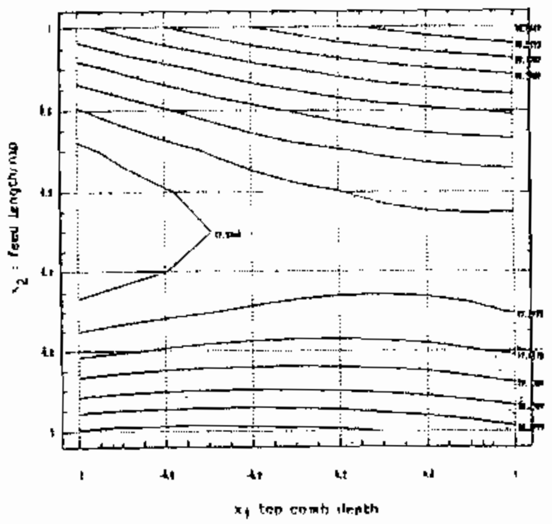


Fig. (3.2) Contours for. 50 % span length (50% S.L) .

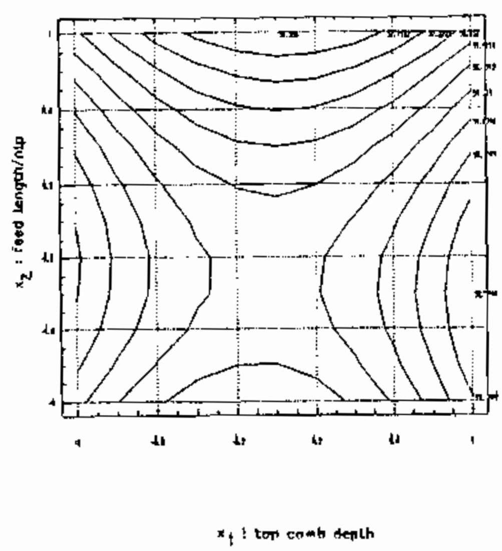


Fig. (3.3) Contours for Uniformity Ratio (UR) .

Fig (3) Effect of top comb depth and feed length/nip on Fiber length distribution of combed sliver.

top comb depth and X_2: feed length/nip. For practical setting of top comb (X_1 = 0 to + 1), the variation in feed length/nip (arround X_2 = 0) causes a slight increase in span length at 50%. Also, a better uniformity ratio, between 54% and 59%, obtained at normal setting of top comb (X_1 = 0) with different levels of feed length/ nip.

3.2 Effect of comber lap weight and setting between nipper and detaching roll.

(i) Comber noil extraction: Figure (4) represent contour of response surface of comber waste extraction%. An increase in setting between nipper and detaching roll (X_1 clearly affect the comber noil percent. An increase of waste extraction with increasing the setting, between X_1 = -1 and X_1 = 0, is observed. This effect deminished at higher values of setting (X_1 = + 1).

On the other hand, the change in comber lap weight, between 55 to 65 g/m, causes an increase in the comber noil. Also, it will be observed that, for lower values of both comber lap weight (X_2) and setting (X_1), the reduction in comber waste becames very sharp.

(ii) Fiber length characteristics: Figures (5.1), (5.2) and (5.3) clearly show the trend for the different parameters of fiber length distribution, SL 2.5%, SL 50% and UR%, as a function of the chosen variables. As can be seen that, the contour lines for SL 2.5%, Fig. (5.1), are ellipses with a minimum falling outside the experimental field. With regard to SL 50%, the contour lines conform to be a eccentric saddle shape. There are also clear trends showing length increasing when lap weight and setting increases. Finally, Fig. (5.3), show the contours for uniformity ratio which conform a saddle shape where as an increase in (X_1) setting and (X_2) comber lap weight eauses uniformity ratio to increase. The minimum incidence of SL 2.5%, SL 50% and UR seems to occurs at a lower setting between nipper and detaching roll, and comber lap weight between 55 and 60 g/m.

3.3 Effect of comber lap weight, feed length/nip and comber noils

Figures (6.1), (6.2) and (6.3) show the effect of feed length/ nip and comber noil extracted for different comber lap weight on fiber length parameters. The contour lines, Fig. (6.1), are ellipses with a minimum falling outside the experimental field. The curves clearly indicate that the fiber length (SL 2.5%) increases with an increase in comber waste extracted. This could probably be due to the fact that the combing removes a large proportion of short fibers resulting in a combed sliver which has a longer fiber mean length. In addition, the influences of feed length/nip and comber lap weight are in agreement with the results obtained in the above sections. As shown in Fig. (6.2), the contour lines for span lengthat 50% conform to be an excentric saddle shape, through there is a displacement of their centre on passing from lighter to heavier comber lap weight (i.e. from 55 to 65 g/m). Also, it will be observed that for higher rate of comber waste extraction (X_3) up to 16% and shorter feed length/ nip the increase in SL 50% became very sharp. Finally Fig. (6.3) show the contours for uniformity ratio which conform a saddle shape, where as an inerease in comber waste extraction (X_3) with varying lap weight (X_1) and feed length/nip (X_2) causes fiber length uniformity of combed sliver to increases.

3.4 Relationship between comber waste extraction and length uniformity ratio (UR%):

It is clear from the above results that the comber machine variables "such as stop comb depth, feed length/nip, eomber lap weight and setting between detaching roll and nipper would affect significantly on the comber waste extraction and fiber length parameters of combed sliver. The values attained depend on the level of chosen variables through experimentation. In the earlier work (13), it was stated that to choose the right quality of the cotton the SL 2.5% and UR% have to be considered separately. Also, these two parameters are also closely to be purchased or supplied makes it possible to predict the percentage of comber noils.

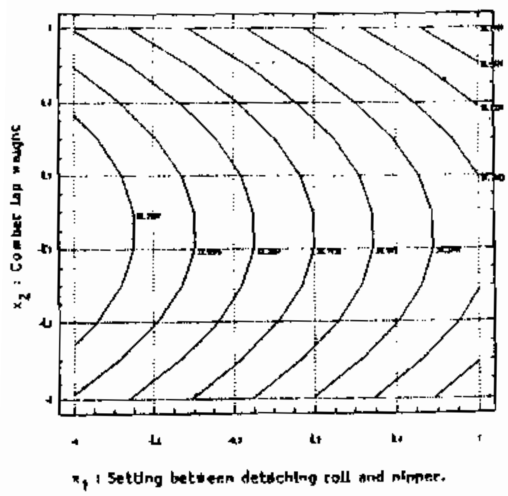


Fig. (5.1) Contours for 2.5% span length (2.5% S.L)

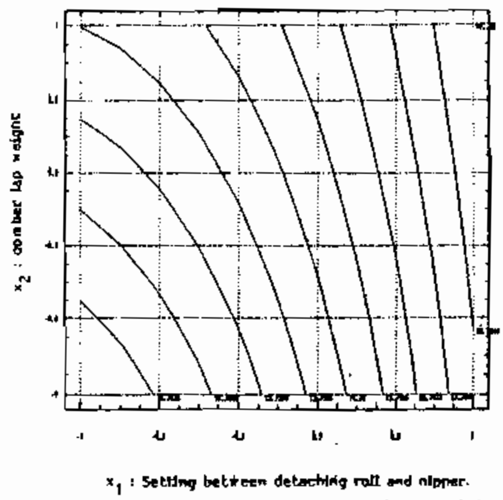


Fig. (4) Effect of Comber lap weight and setting between detaching roller and nipper on comber waste extraction.

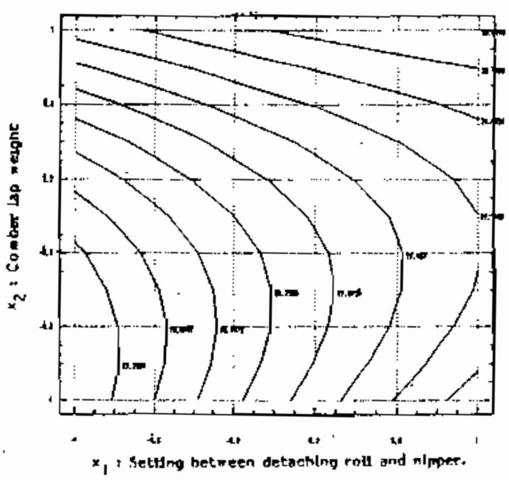


Fig (5.2) Contours for 50% span length (50%S.L)

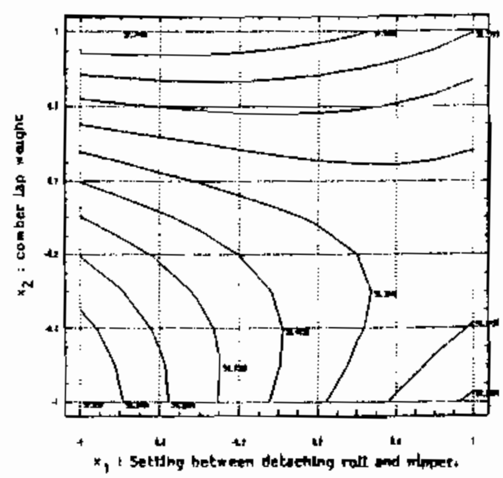


Fig. (5.3) Contours for Uniformity ratio (UR).

Fig(5.) Effect of Comber lap weight and setting between detaching roller and nipper on fiber length distribution of combed sliver.

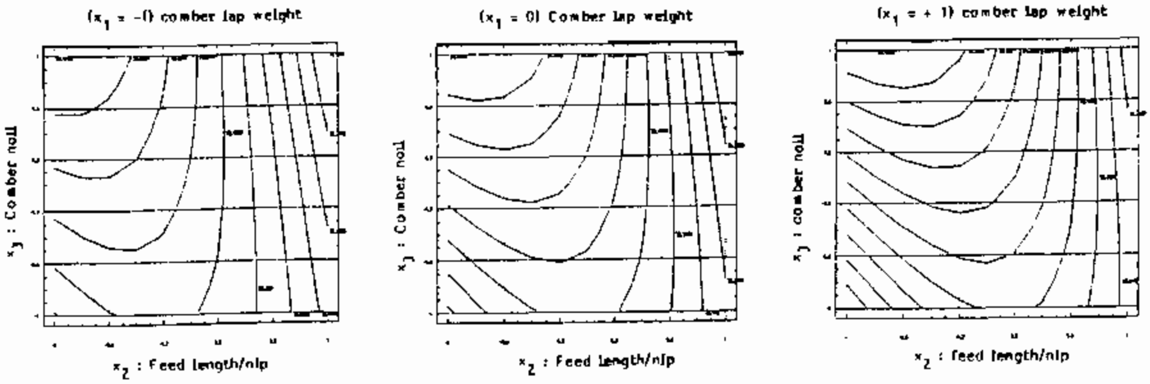


Fig. (6.1) Contours for 2.5% span length (2.5%SL)

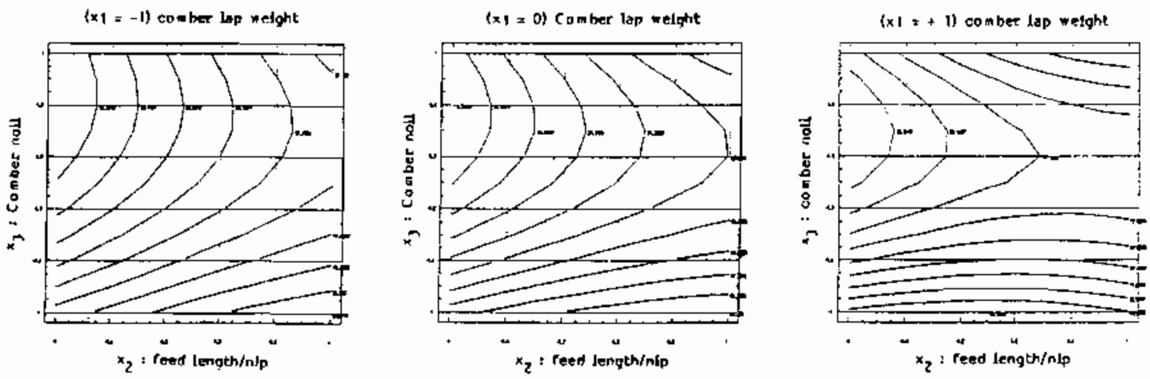


Fig. (6.2) Contours for 50% span length (50%SL).

The interdependence between the obtainable uniformity ratio of combed sliver and the amount of comber noils is shown in Figures (7.1), (7.2) and (7.3). From Figures (7.1) a and (7.1) b the curves indicate the 2.5% span length and length uniformity ratio UR% increases with the increase of comber noil% regarding the effeet of top comb depth and feed length/nip. The variation in top comb depth causes substantial increase in comber waste as well as fiber length uniformity than those obtained with feed length at comber. For cotton fiber "Giza-70" a better uniformity can be obtained within the range of 11% to 14% comber noils. The percentage of comber waste above this level does not show any reasonable increase of fiber length uniformity especially with long fed length/nip.

In respect of the effect of comber lap weight and setting between detaching roll and nippers, bar charts (Figures (7.2) a and (7.2) b) illustrate the rate of variation in uniformity ratio which is about 7% to 1%. Also, the results indicate that the increase of comber noils from 1.4% to 4.2% regarding the comber lap weight. While it ranged between 5.7% and 8.5% in respect to setting between nippers and detaching roll. The curves in Fig. (7.2) c show the in terdependence between uniformity ratio and comber waste%. The length uniformity ratio increases with an increase in comber noils up to 16%. Also, beyond this level there was tendancy towards a slight change of uniformity ratio to occur when the comber noils was increased. In addition, the results indicate that a better values of uniformity ratio is associated with the variation of comber lap weight than those obtained with regarding to setting, which causes a higher rate of comber waste%.

The relationship between comber waste extracted and uniformity ratio regarding to the effect of three variables, the comber noils, feed length per nip and eomber lap weight, as shown in Figures (7.3) a, (7.3) b and (7.3) c may be explained as follows:

i) At a certain level of comber waste, it can be noticed that:
  - For the same feed length/nip, the variation of comber lap weight causes an increase in uniformity ratio between 0.3% to 1.5%.
  - While at the same comber lap weight, the variation in feed length/ nip causes an increase in uniformaity ratio from 2% to 5%.

ii) On the other hand, as the comber waste% varies it can be observed that:
  - For the same lap weight and feed length/nip, the increase in comber noils from 12% to 20% cause change in uniformity ratio about 2% to 5.5%.
  - For the same lap weight with varying the feed length/nip. The increase of comber waste up to 16% causes an increase in uniformity ratio, while beyond this level, from 16% to 20%, the length uniformity ratio decreases.
  - For the same feed length/ nip with varying the comber lap weight, the length uniformity (UR%) increases by 5% to 7.5% as the comber noils increases up to 16%.

4- CONCLUSION :

In the present work, the experimental design techniques, either the application of Box (11) or/and Box and Behnken (12) design's, applied to study the relationship between some processing variables at comber machine on one hand and comber strand quality "Comber noils and fiber length characteristics" on the other, led to the following conclusions :-

1) The relative importance of the factors which affect the comber noils, SL 2.5%, SL 50% and length uniformity ratio (UR%) of combed sliver was clearly established and stated in the following:
  - By far the most important of the comber variables are the top comb depth and setting between detaching roll and nippers which affect significantly on comber noils at 99% significance level.
  - The feed length per nip affects on comber noil extraction in a highly significant manner similar to comber lap weight at 95% significance level.

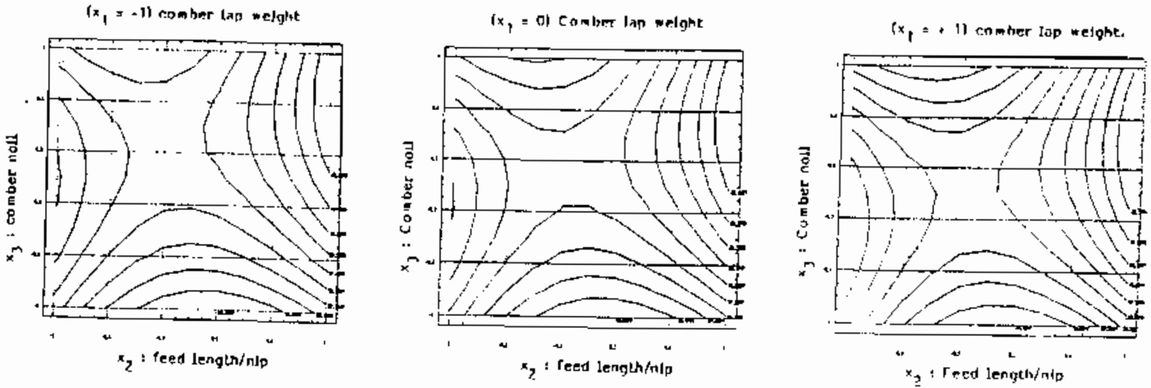
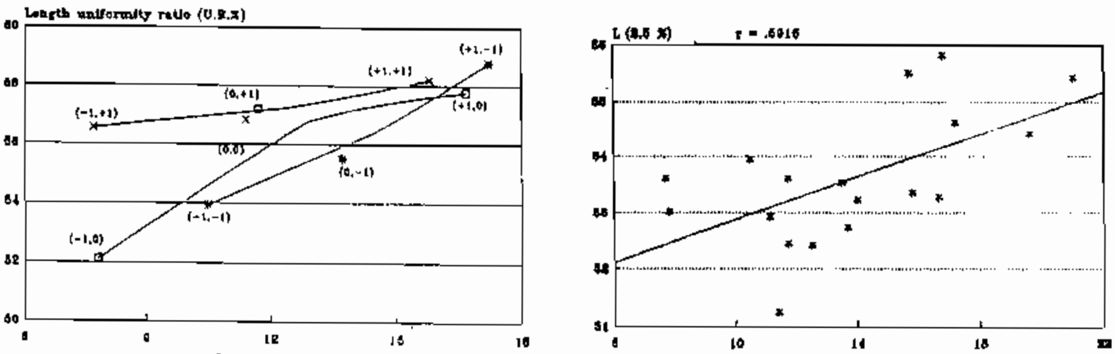


Fig. (6.3) Contours for Uniformity Ratio (UR)

Fig. (6). Effect of comber noils, Comber lap weight and feed length/nip on fiber length paramters of combed sliver.



Fig(7.1) U.R % against comber waste % due to the effect of top comb depth and feed length per nip

Fig(7.2) (2.5 %) against comber waste % due to the effect of top comb depth and feed length per nip

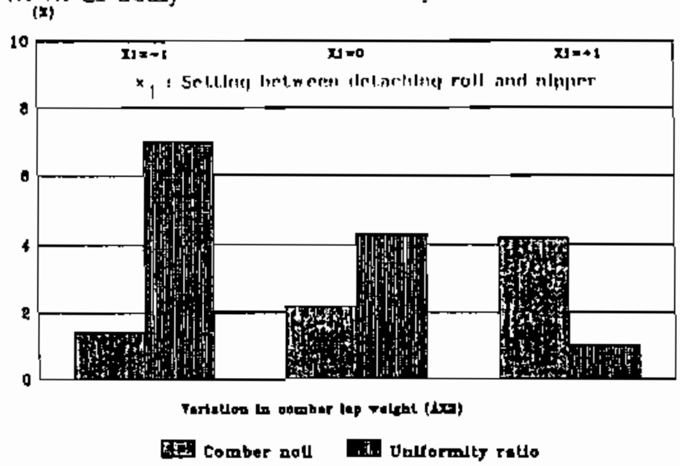


Fig (7.2)a

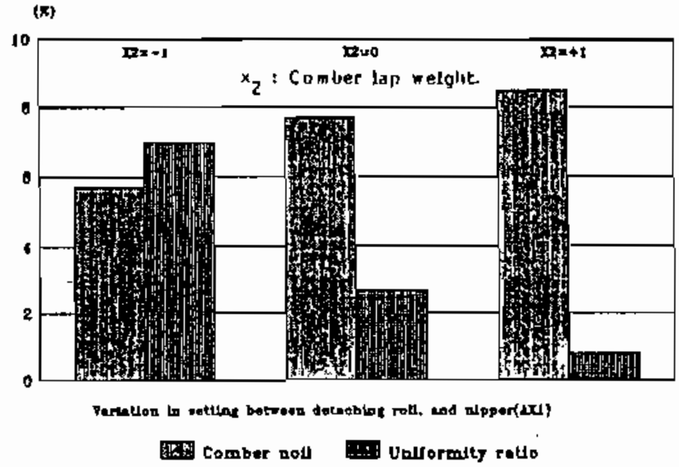


Fig (7.2)b

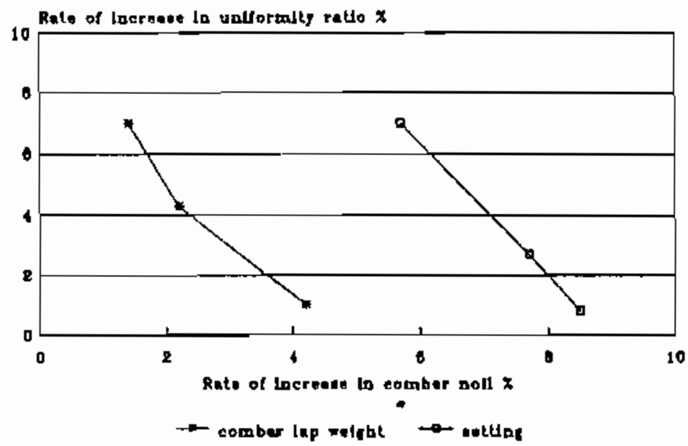


Fig (7.2)c

Fig. (7.2) Variation in UR% and Comber noil% due to the effect of comber lap weight and Setting between detaching roll and nipper.

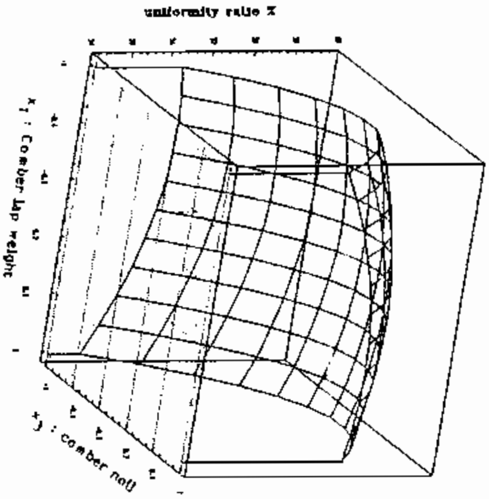


Fig. (7.3)$_b$ Contours for Uniformity ratio (UR %)

(x_2 : feed length = 5.24 mm)

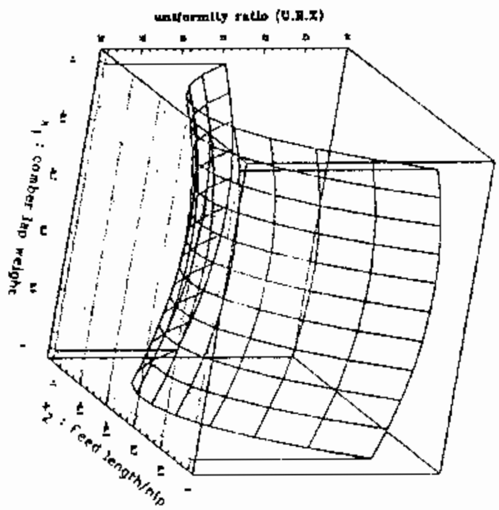


Fig. (7.3)$_a$ Contours for uniformity ratio (UR %).

(x_3 : Comber noil = 16%)

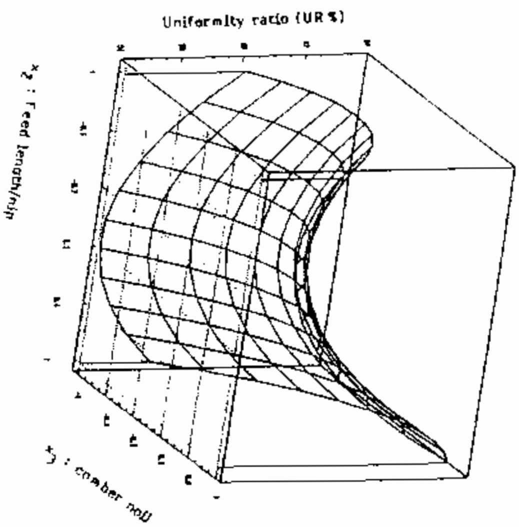


Fig. (7.3)$_c$ Contours for Uniformity ratio (UR %)

(x_1 : Comber lap weight = 60g/m)

2) The experimental techniques which were applied also helped to define the most suitable conditions for the combing process and these can be summarised as follows:

i) In terms of the effect of top comb depth and feed length/nip:

- The top comb is responsible for the removal of the bulk of comber noil% at the comber. A sharp decrease in the percentage of noils when the top comb is not used arises from its elimination as an element which restrains the tuft and prevents fiber entrainment during detaching. This effect is prominent with longer feed length/nip than those obtained at shorter feed length.
- The variation in top comb depth causes a substantial increases in comber waste as well as length uniformity ratio than those obtained with feed length per nip.
- It seems that a better fiber length uniformity occur within the range of comber noils from 11% to 14%. Also, the comber noil increasing beyond the above limits results in a little change in uniformity ratio.

ii) In terms of the effect of comber lap weight and setting between nippers and detaching roll:

- Lighter comber lap weight and closer setting causes a reduction in comber noil %.
- The variation in comber lap weight and setting result-in an improvement in fiber length uniformity.
- The values of fiber length parameters obtained in respect to setting between detaching roll and nippers associated with a higher rate of comber waste%.

iii) In terms of comber lap weight, feed length/nip and comber noils:

- The variation in comber lap weight, within the limit of experimentation from 50 to 65 g/m, with the same feed length and comber noil% leads to an increase in uniformity ratio between 0.3% to 1.5%. This is lower than those obtained with varying the comber noils up to 16%, which is about 5% to 7.5%.
- The variation in feed length/nip, from 4.91 mm to 5.61 mm, at the same comber lap weight and comber noils causes an increase in length uniformity of about 2 to 5%, but within the range of comber noil% from 16% to 20% the uniformity ratio is not dependent on the feed length.

REFERENCES:

(1) Hunter C. O., Text. Res. J. 28, 502, 1958.

(2) Morton W. E. and Sumers R. J., Journal of Text. Inst., 44, T. 317 (1953).

(3) Nutter, W. and Slater, W. J. Text. Inst. 50, p 397 (1959).

(4) Wilhelm A. and Wagner, H. Text. praxis, 3, 223 (1957).

(5) Wakankar, V. A. and Bhaduri S. N., Text. Res. J. Augst (1962).

(6) Nutter, W., Text. Res. 81, Oct. p. 98 (1963).

(7) Azek, L., Oetsch Textiltech. 11, p. 405 (1961).

(8) Nozaki C. et. al. J. Text. Mach. Sco. Japan, 14, p. 25 (1961).

(9) Canad. Text. J., 1962, 79 No. 15, 12; Text. Bull. 1962, 88, No. 8, 10.

(10) High production comber "CM 8 Toyoda; Platt sacolowell Type 723; Marzoli P_2.

(11) Box G. E. P. et. al. "The Design and analysis of Industrial experiments" Publ. by Imp. Chem. Ind. Limited (1963).

(12) Box G. E. P. and Behnken O. W., Technometrics, 1960, 2, 455.

(13) Preysch M., Text. praxis, 519-524, (1972).