(REFEREED RESEARCH)

A RESEARCH FOR THE ELIMINATION OF PATTERN AND PRODUCTION DEFECTS ON THE MAN'S JACKET

ERKEK CEKETİNDE KALIP VE ÜRETİM HATALARININ GİDERİLMESİ İÇİN BİR ARAŞTIRMA

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ABSTRACT

When the man's jacket is examined in terms of garment comfort; besides the accuracy of the pattern and its conformity with the body structure of wearer, paid attention on the quality features during production steps appear as titles to be overemphasized during marketing, sales and consumption phases. It shouldn't be ignored that the differences in mm scale in pattern details or production defects cause serious quality and comfort problems, thus the quality features for man's jacket in terms of pattern and operation must be considered thoroughly. The accuracy of the pattern and accurate application of quality features in production techniques are on great importance in this respect. In this research the man's jacket and its production phases were studied in solution studies conducted for the elimination of pattern and production defects that were identified to have adverse effects on the man's jacket in terms of comfort, effort was made for modification and improvement.

Keywords: Apparel, Suit Quality, Garment Comfort.

ÖZET

Erkek ceketi giyim konforu özellikleri açısından incelendiğinde; ceket kalıbının doğruluğu ve giyen kişinin vücut yapısı ile uyumu ile birlikte üretim aşamalarında kalite özelliklerine dikkat edilmesi, ürünün pazarlama, satış ve kullanım süreçlerinde önemle üzerinde durulması gereken başlıklar olarak karşımıza çıkmaktadır. Kalıp detaylarında veya üretim hatalarında milimetre boyutunda farklılıkların bile ciddi kalite ve konfor rahatsızlıklarına yol açtığı göz ardı edilmemeli, erkek ceketinde kalıp konusu ve operasyon bazında kalite özellikleri üzerinde önemle durulmalıdır. Kalıbın doğruluğu ve üretim tekniklerinde kalite özelliklerinin doğru uygulanması bu açıdan çok önemlidir. Bu araştırmada erkek ceketinde giyim konforunu olumsuz yönde etkilediği belirlenen kalıp ve üretim hatalarının giderilmesi konusunda yapılacak çözüm çalışmalarında erkek ceket kalıbı ve üretim aşamaları üzerinde çalışılmış ve düzeltme ve iyileştirme çalışmaları yapılmıştır.

Anahtar Kelimeler: Konfeksiyon, Takım Elbise Kalitesi, Giysi Konforu.

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1. INTRODUCTION

The first image that reminds us of the male elegance is the image of men's suit. The values such as austerity, respectability, functionality assigned to working men after the industrial revolution are represented with the combination of jacket, pant suit. Serious nature of work is identified with suit and this meaning continued up to day (1, 2)

The changing industrial structure and increasing importance of services economy plays an important role in the emergence of business areas/fields that underlines value of men's display. The increase in number of office jobs in which personal presentation becomes more important or customer relation oriented services industry causes an attraction towards suits again. As a consequence the menswear market has developed faster.[1] As men's wardrobe enriches with the product variety the suit with the power of social notions it carries within continues to keep its significant place in working men's life. From the producers aspect it stands out with its higher added value among apparel products, though the investment required is relatively higher and the operations are complicated. (3)

[1] In 2008 Consultancy Bain & Co estimates the luxury menswear market to be worth 180 billion euros ($240 billion) and growing at about fourteen per cent a year, nearly double that of luxury womenswear at eight per cent (4)

The most visible element of suit is jacket and the comfort of the jacket is an important issue. This jacket differs from other clothing elements by its constructed structure. While majority of clothes take their forms from the shape of their wearers, jacket structure covers and reconstructs male figure. (1) As a result of these reasons jacket is expected to be perfect in terms of appearance and comfort.

The way it is constructed is a sculptural deconstruction of the male body. The padding on the shoulders and support on the chest emphasize the strong masculine body image. New techniques in tailoring such as padding, use of steam, pressure and stiffening to mould woolen fabric to the body gives the structure to a jacket. The wool fabric under pressure and steam gets form easily. Horsehair, interlinings, fill up the chest and support a stronger look, which constitutes the second level of masculinity that is based on physical power. Padding on the shoulders create a wider muscular perception on the observer, and finally proportionally fitted waistline gives the final touch in order to create the masculine V shape. After all technical tricks a jacket looks three dimensional in its body like certain shape even when it is on a hanger, and it is how that suit makes it possible to embody the ideal male on every men. (1) Therefore it is important to have a perfect cut and perfect look. Visual comfort of this sculptural product is depending on the quality of the cut and tailoring. Additionally the cut of pattern developed for people differing from standard measurements must be specially constructed with custom measurements to maintain the ideal masculine form. It is necessary to establish a suitable pattern form for the wearer to enable him function while looking good. Minor mistakes in measurements may cause significant defects so it must be seriously taken into consideration in terms of the psychological comfort of the jacket.

Aim of the research is to sort out the visual mistakes that play a role on the psychological comfort of clothes and suggest solutions.

2. LITERATURE REVIEW

In this research; for the selection of production based defects and the pattern studied, the authors concentrated on the defect types and frequencies coincided in the study of Turkmen, S, Kırtay, H.E related with Creating A Modern Quality Control System for the Production of Classical Men's Suits published in Journal of Textile and Apparel.(5)

In order to investigate the source, for the identification of defect sources and frequencies, the data obtained from the quality control stations were evaluated using Pareto Analysis. In order to identify the causes of defects Cause-Effect Diagrams were prepared, and Brain Storming Technique was used to suggest solutions.(5)

3. MATERIAL AND METHOD

3.1. Material

The jacket samples related with the common production defects were taken in this study concerned with the analysis and elimination of the defects that cause failure in clothing comfort and physiological comfort in man's jacket which is our research material.

3.2. Method

In this study jacket samples related with the common production defects were utilized. Modification and improvement works were applied on these samples and their patterns. Man's jacket pattern that is our research material was examined in identification and analysis of defects that have adverse effects on comfort and that occur during man's jacket production, and in solution seeking for the elimination of defects.

The defects that cause failure in garment and physiological comfort due to the identification of the causes of defects were divided into two groups:

Pattern-Based Defects

Production-Based Defects

In the solution studies conducted for the elimination of pattern-based defects identified, the man's jacket pattern was studied and modification and improvement works were carried out. New jackets were sewed due to the pattern prepared as a result of the studies and they were controlled.

In this research, 3 defects identified to be pattern-based and 3 defects identified to be production-based, thus 6 defects which were among the defects coincided at high frequencies in quality control stations, were specified as the pilot studies.

First of all cause and effect analysis were performed in order to identify the defects investigated in quality control stations, which were based on violating the operational quality features and to suggest solutions. For suggesting solutions, Brain Storming technique was used in the meetings and examinations conducted with the business managers and they were applied to the modification studies.

4. RESULTS AND DISCUSSION

4.1. Control Producers and Evaluations Still İn the Company

Results obtained by 100% controls conducted in control points in production line quality control station are scored into quality control forms issued by the company producing the jackets. Defects are marked into the scorecards by marking A,B or C according to the importance level of the defect and final results are evaluated in the quality control department.

4.2. Pattern Based Problems

The pattern defects of the defects occurred in the man's jacket that were qualified as pattern based were studied as explained in the method section of this paper.

The following section consists of the defects specified at man's jacket control stations which were studied for correction on the man's jacket pattern.

4.2.1 Piling at the Nape Problem of Back Body

The data for the piling problem at the nape of the back body detected during the checks in control stations are given in Table 4.1 and the photo of the jacket with the piling at the nape problem of the back body is presented in Figure 4.1.

Table 4.1. Data for the piling at the nape area detected at jacket skirt overalls quality control points

Control Station	Overall Number of Items Checked	Type of Defects	Number of Defects	Defects %
Jacket's Hem Overalls Output	1953	Piling At The Nape	556	28,46

Figure 4.1. The Jacket Defect Related with Piling at the Nape Problem

- The Studies Conducted for the Investigation of the Defect Sources and Offering Solution

The unconformity between the armhole heights of front and back body patterns' was investigated to cause the piling at the nape problem of back body in the analysis conducted to determine the source of the defect. For the elimination of the pattern defect with the known reason, the armpit, shoulder height in the back body was remedied by lowering the neck hole height and extending the circumference of neck hole, lowering the armhole line in accordance with the back body at the side part and equalizing the slope accordingly until the waist point. The corrections made in the pattern are shown in Figure 4.2

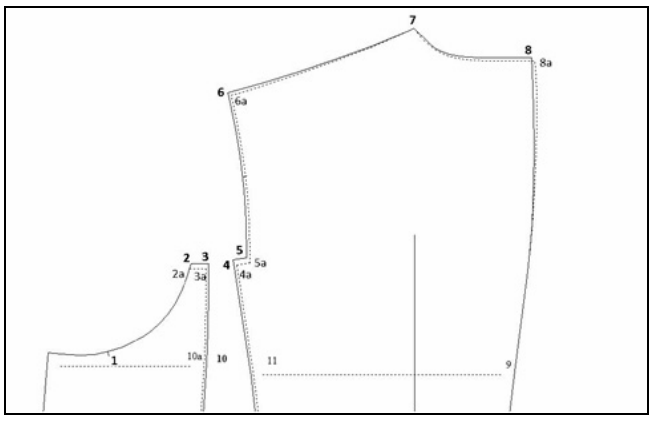

Figure 4.2. Pattern Correction Work Conducted for the Solution of Piling at the Nape Problem In the correction studies conducted at side patch and back body related with the defect points specified in the pattern;

At the side patches,

- Point 1 was maintained constant,
- At the side patch armhole region, point 2 was lowered to point 2a by 0.5 cm; point 3 was lowered to point 3a by 0.5 cm.
- Point 10 was dislocated inwards to point 10a by 0.2 cm.
- Correction Works were equalized at the waist line.

At the Back Body,

- Point 11 was maintained constant,
- At the back body armhole region point 4 was lowered to point 4a by 0.5 cm, point 5 was lowered to point 5a by 0.5 cm.
- At the back body armhole line shoulder point, point 6 was lowered to point 6a by 0.5 cm.
- Back body neck hole shoulder point 7 was maintained constant.
- Back body neck hole was lowered from point 8 to point 8a by 0.5 cm and dislocated outwards by 0.5 cm. The neck hole was enlarged by 1 cm.
- The pattern was equalized at point 9.

The photos of the jacket tailored as a result of the correction works related with the piling at the nape problem of back body are shown in Figure 4.3.

Figure 4.3. The jacket with corrected pattern

4.2.2. Neck Breaking Line Defect

The data for the neck breaking line defects detected at the control stations are given in Table 4.2 and the photo of the jacket with neck and facing breaking line defect is presented in Figure 4.4.

Table 4.2. Data for the neck and facing breaking line defects detected at the front body preparation outlet control station

Control Station	Overall Number of Items Checked	Type of Defects	Number of Defects	Defects %
Jacket Size Preperation	7754	Fusing Hair Interlining	260	3,35

Figure 4.4. Jacket Defect Related with the Neck Breaking Line

The straight line which is qualified as the bank line of neck and facing can be defined as; the straight line of neck and facing inwards from the folding mid-point of the neck at the nape on top (approximately 0.5 cm above the collar stand seam) to the point of intersection of buttonhole-button position horizontal line at the bottom, shall cross the collar edge line (the line marked in Figure 4.4) approximately 1.5 cm above the buttonhole-button horizontal line and the collar shall be tilted over that point.

The defect seen in Figure 4.4 was caused by the swirling line swirled not at the defined swirling line but swirled below (below the buttonhole-button horizontal line) the than that.

- The Studies Conducted to Identify the Sources of Defects and Offering Solution

The defect occurred at neck-facing swirling line was investigated to be caused by the unconformity of hair insertion pattern and front body pattern and the tightness within the inner circumference of collar, at the studies conducted for the investigation of the source of the defect. The defect 1a-2a line that is defined as the swirling point of collar at front body of the hair insertion in hair insertion pattern was corrected and a new hair insertion pattern with accurate 1-2 line was made for the correction of the pattern defect with the known cause. Besides the tightness identified around the inner collar was recovered by giving expansion allowance of 0.5 cm –at half size- to each of collar, collar stand and lamination pattern. (This expansion work applied on the collar was applied on the back body neck hole simultaneously in Figure 4.2) The correction works applied on the patterns are given in Figure 4.5 and 4.6

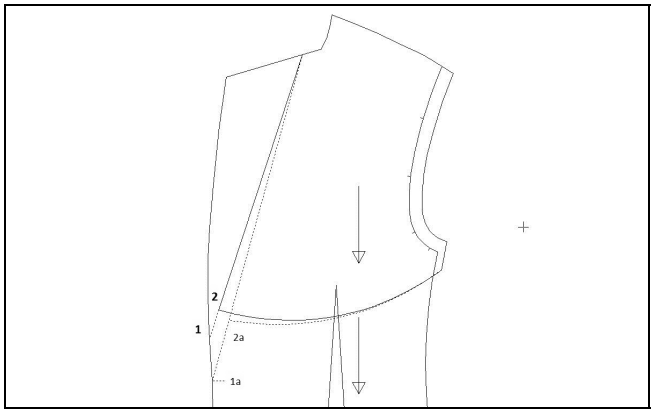

Figure 4.5. Hair Insertion Pattern Correction Work

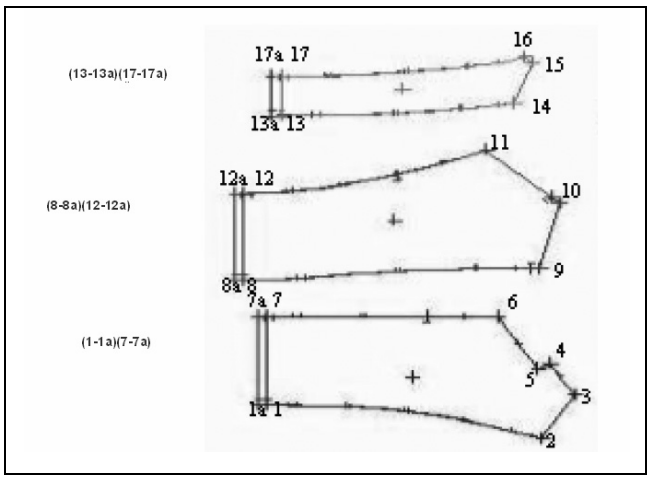

Figure 4.6. Neck Pattern Correction Work

The photos of the jacket sewed as a result of the correction works applied on the pattern are given in Figure 4.7.

Figure 4.7. The Jacket on which Pattern Correction was applied

4.2.3. Fitting Problem Caused by the Sleeve Not-Fitted Sharply within the Lower Inner Part of Armhole

The data for the defects caused by the failure in the positions of body and sleeve at the lower region of arm hole at the inner part of the sleeve are given in Table 4.3 and the photo of the jacket with this failure is presented in Figure 4.8

Table 4.3. Data for the defects caused by the failure in the positions of body and sleeve at the lower region of arm hole at the inner part of the sleeve

Control Station	Overall Number of Items Checked	Type Of Defects	Number of Defects	Defects %
Jacket Final Control	8978	Failure in Fitting at the Inner Lower Part of The Arm	3824	42,59

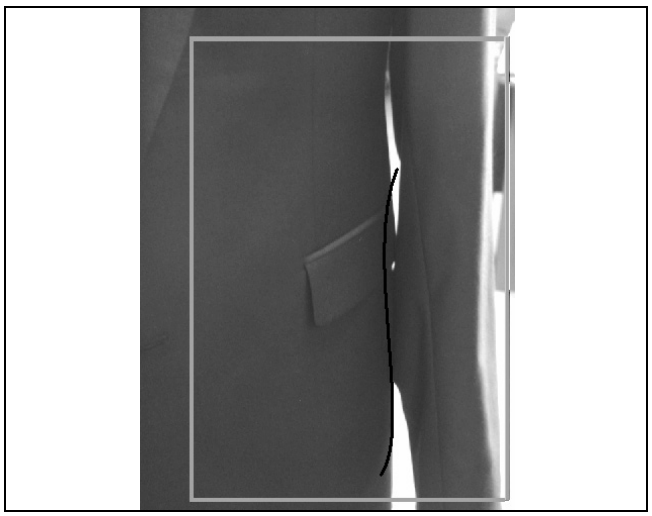

Figure 4.8. The Jacket Defect Related With the Failure in Fitting at the Inner Lower Part of the Arm

As can be seen in the photo in Figure 5.8 the sleeve doesn't stand sharply at the inner lower armhole region. It is in unconformity with the body, it has a balloon like appearance and the sleeve doesn't go sharply with the body.

- The Studies Conducted to Identify the Sources of Defects and Offering Solution

The defects of sleeve cap pattern and back body and side part armhole pattern were identified to cause the sleeve not to stand sharply at the inner part of the sleeve resulting in the formation of a balloon in the analysis conducted for the investigation of the source of the defect. First of all the height at peak point slope in the sleeve cap pattern which was identified as the cause of defect, was recovered by reducing the peak point slope by 0.5 cm (In Figure 4.9 the point 5 was maintained constant, the sleeve peak point 4 was lowered to point 4 by 0.5 cm). The correction works conducted on sleeve cap pattern are given in Figure 4.9

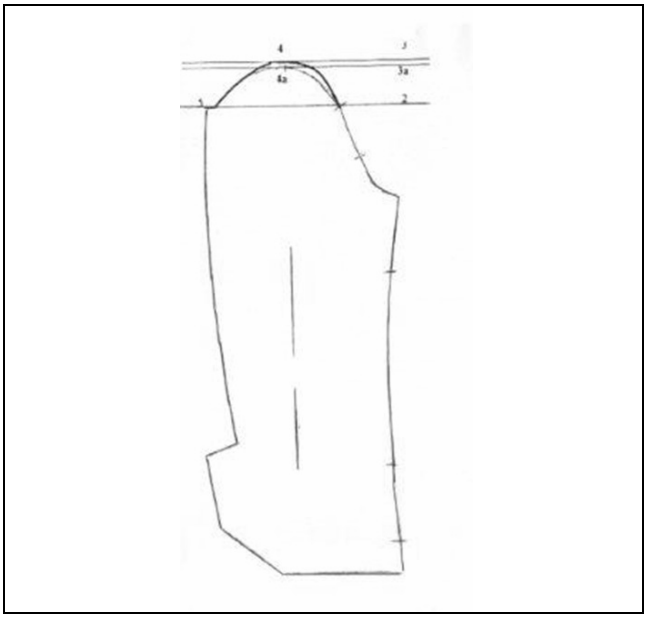

Figure 4.9. Correction Works on Sleeve Cap Pattern

Armhole slopes at the back body and side part were trimmed as a second solution step.(Figure 4.2) As a consequence of correction works of pattern defects, the sleeve was observed to release and comfort itself by the reduction of sleeve peak height, the conformity of sleeve and armhole and adherence of the sleeve to the body were provided by lowering the scope on the body. The photo related with the jacket sewed as a consequence of correction works is shown in Figure 4.10.

Figure 4.10. Lower Arm Fall Problem Solved Jacket

4.3. Production-Based Problems

The defects occurred at the men's jackets that were determined to be based unconformity with the operational quality features at production phases , as explained in the methods section of the study, were identified at production line control stations and some of them were given below. In the studies conducted for identification of the sources of defects and offering solutions, the studies conducted for the identification of the factors that cause the defects related with the production failures coincided at quality control stations and solutions suggested using the Brain Storming Technique meeting with the operation managers and the results obtained as a consequence of application are given below.

4.3.1. Side Pocket Flap and Fillet Based Defects

The data for the side pocket flap and fillet defects that were identified at jacket production front body preparation quality control station are given in Table 4.3 and the photo related to this problem is presented in Figure 4.11.

Table 4.3. Data for the side pocket flap and fillet defects identified at jacket production front body preparation quality control station

Control Station	Overall Number Of Items Checked	Type Of Defects	Number Of Defects	Defects %
Jacket Size Preperation	7754	Side Pocket Defects	2240	28,88

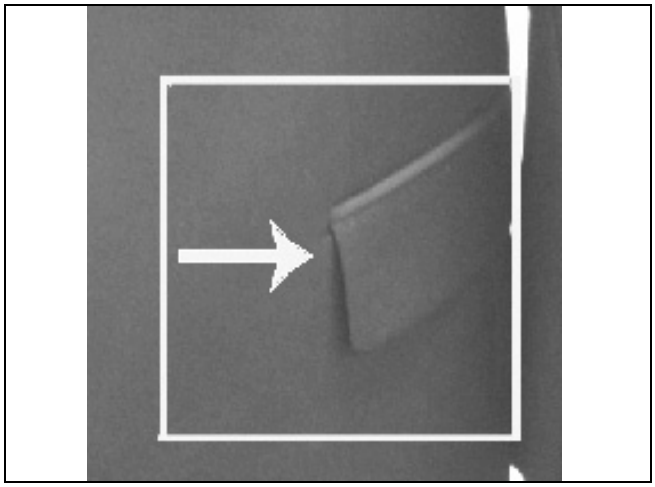

Figure 4.11. Jacket Side Pocket and Fillet Defect

In the side pocket flap and fillet defect in Figure 5.11, the size of the fillet being greater than the flap and a space of approximately 0.5 cm between the edge of the flap and fillet pinning line, are explicitly observed.

- The Studies Conducted to Identify the Sources of Defects and Offering Solution

In the analysis conducted for the source of the defect, the side pocket and fillet defect was identified to be caused by the problem related with the machine maintenance. Laser lights that identify the start and end points for the side pocket fillet automatic machine, controls the stitch start and end commands. Resulting from the failure of routine cleaning controls in the system, the fillet stitch length that is supposed to be 16 cm., passed beyond the fillet stitch length marks (programmed) and caused the stitch to be 16.4 cm, due to the dust formation on photocell, as a consequence the fillet stitch happens to be 4 mm longer than the width of the flap. Occurrence of such a defect causes the formation of a gap beyond the fillet, as a consequence the fillet happens to be larger than the flap. The photo of the jacket sewed as a result of the correction of the factors that cause the defect is shown in Figure 4.12

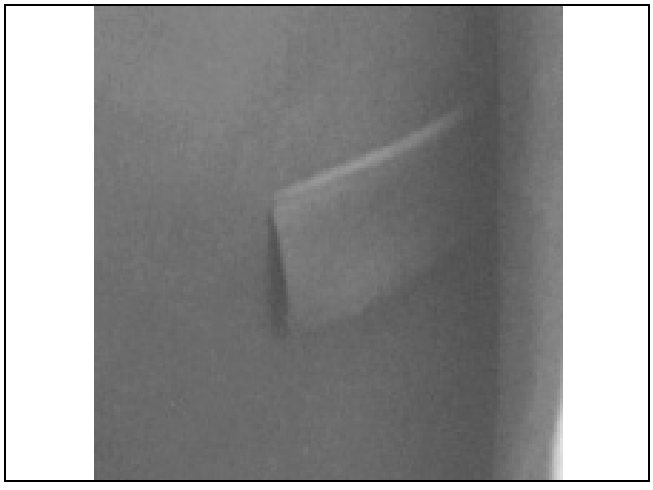

Figure 4.12. Jacket with Fillet and Flap Defect Remedied

4.3.2. Hair Insertion Tautening Defect at Upper Chest Region

Data for the tautening problem at upper chest region identified at the jacket production quality control station is given in Table 5.4 and the photo of a jacket with this type of fault is presented in Figure 4.13.

Table 4.4. Data for the tautening problem at upper chest region identified at the jacket production quality control station

Control Station	Overall Number of Items Checked	Type of Defects	Number of Defects	Defects %
Jacket Final Control	8978	Tautening Hair Interlining	754	8,39

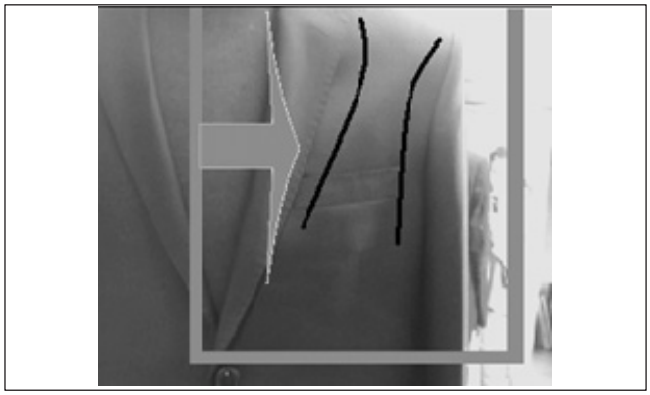

Figure 4.13. Tautening Problem at Jacket Chest Region

As can be seen in the figure above, the tautening defect at upper chest region of the chest which was coincided at the jacket production quality control station was identified to be caused by the hair insertion that was not suitable for the operational method and quality features during its mounting to front body and armhole.

- The Studies Conducted to Identify the Sources of Defects and Offering Solution

The defect related with the tautening at the chest which was presented in the results section, was determined to be caused by the failure in stapling of the hair insertion during front body press operation, with the help of the studies conducted to identify the source of the defect. Therefore the source of the defect was identified to be caused by the lack of methodology and human factors.

Form imparted to the chest region during press operation, must be fixed to the armhole region by stapling provided that the front body of the jacket is not removed from the press table. Otherwise, following press operation, the allowance imparted by bending the collar according to the needs of operational method during the clamping operation of hair insertion to armhole at front body armhole section to the armhole by blade machine, would be insufficient. Such allowance is the allowance required by the collar due to turning after the form imparted by press at chest. The photo of the jacket remedied after eliminating the factors that cause defect, improving the operational method training and quality control studies, is shown in Figure 4.14 below.

Figure 4.14. The Jacket Sewed Eliminating the Operational Defect

4.3.3. The Production Defect Caused by the Sleeve Inner Clamping Stitch Turning Outwards

The data for the jacket defects related with the inner sleeve clamping stitch turning outwards through the sleeve hem region, coincided at jacket production quality control station, are shown in Table 4.5 and the photo of a jacket with this type of fault is presented in Figure 4.15.

Table 4.6. Data for the defects caused by the incompatible positionning of the body and the sleeve at the lower region of armhole.

Control Station	Overall Number Of Items Checked	Type Of Defects	Number Of Defects	Defects %
Jacket Final Control	8978	Attaching Sleeve Defects	3824	42,59

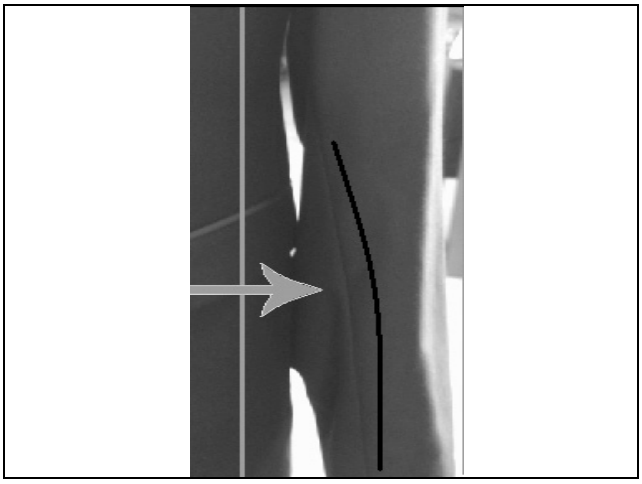

Figure 4.15. Turning Outwards Problem of Inner Sleeve Clamping Stitch

As can be seen in Figure 4.15, the defect caused by the sleeve inner clamping stitch turning outwards, which was coincided at jacket production quality control station, was identified to be based unconformity with the method and operational quality feature during sleeve attachment operation.

- The Studies Conducted to Identify the Sources of Defects and Offering Solution

The defect related with the upper and lower sleeve clamping inner stitch turning outwards problem, which was identified in quality control stations, was determined to be caused by method and human based factors during sleeve fitting operations, in the analysis conducted to investigate the source of the defect.

Right fitted sleeve stand form meeting the requirements of sleeve fitting operation method definition; (Providing that the sleeve ham is folded in two from the aperture edge) it must stand in such a way to stand straight through sleeve straight line from the peak point and to center the pocket flap. In the meantime there must be no fitting defects at front armhole and no breaks on the stitch. The upper front part of the sleeve must be in form of balloon leaning on the Wall and there must be no Groove at the upper sleeve mirror region, the sleeve must stand flat and straight, the body and sleeve must be in conformity.

According to the definition of this method, providing the patterns of sleeve and armhole are right, the notches are well suited in cutting and method and quality features in all operations of preparation units are complied, one must start fitting the sleeve to body operation matching the point 1 on the sleeve with point 1 on the body. The following matters must be considered during operation; the notches must be in such a way that they match on body and sleeve, the stitch allowance stays within 1-2 mm margins through the entire armhole.

The photo of the jacket remedied after eliminating the factors that cause defect, improving the operational method training and quality control studies, is shown in Figure 4.16 below.

Figure 4.16. The Jacket Sewed Eliminating the Sleeve Fitting Operation Defect

5. CONCLUSIONS

The man's jacket examined under this study is a garment differed from the basic physiological/thermal properties of the fabric strengthened by various materials such as lining interlining which doesn't have skin contact property, therefore motion comfort properties were focused. When the

body motion comfort is examined considering the man's suit, the jacket must be in conformity with the body structure and size of the wearer, it should be light and comfortable in such a way that it doesn't restrict the freedom of motion. Tight and slim fit jacket oriented fashion trends of 2000s, has led to the need for detailed studies in jacket pattern in order to provide the comfort in motion. The body part covered by the jacket that is in dense motion is arm and shoulder joint. The form of the garment must be in such a way that it doesn't restrict the ability in motion provided by the joint which is in the shape of ball race placed in the shoulder. The armhole width that will comfort the arm motion can be imparted to a slim fit sleeve by deep working on the sleeve sphere.

Another important factor in providing the conformity of sleeve and body and ease in motion in jacket pattern is the amount of breaks and break distribution regions around the shoulder. The breaks given at points where the stretching motion applies force on the stitches provide flexibility and increase strength. When the man's jacket is examined in terms of garment comfort; besides the accuracy of the pattern and its conformity with the body structure of wearer, attention paid on the quality features during production steps appear as titles to be overemphasized during sales and utilization phases.

It shouldn't be ignored that the differences in mm scale in pattern details or production defects cause serious quality and comfort problems, thus the quality features for man's jacket in terms of pattern and operation must be considered thoroughly. The accuracy of the pattern and accurate application of quality features in production techniques are on great importance in this respect.

In this research the common quality defects coincided in man's jacket that have adverse on clothing comfort in particular are studied. However there may be defects other than these. Such defects must be examined and corrected. The principles of study used in this research must be taken as basis also for these defects.

In conclusion, identification and analysis of quality features for the production process and pattern steps of man's jacket, development and improvement studies to be suggested based on the results and their sustainability must be the primary aim of the plants. Since the competition clauses have become though today, considering today's world of production the brands and plants that are able to produce high quality products at lowest cost in the fastest way possible will be there in the future.

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