ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

ELABORATION OF ORGANIZATIONAL CONTROL STRUCTURES BY MONITORING PRODUCTS IN THE TEXTILE GARMENT INDUSTRY: AN EXAMPLE FOR A PAIR OF TROUSER

OANA Ioan Pavel[1], OANA Dorina [2]

[1, 2] University of Oradea, Faculty of Energy Engineering and Industrial Management, Departament of Engineering and Industrial Management in Textiles and Leatherwork, 410058 str. B. Ștefănesu Delavrancea , nr.4 Oradea, Bihor,România, E-Mail: oanaioanpavel@yahoo.com

Corresponding author: Oana, Ioan Pavel, E-mail: oanaioanpavel@yahoo.com

Abstract: *Any activity carried out in garments business to improve quality must comply with the following principles:In order to carry out the production activity in normal parameters, it must first comply with the technical documentation elaborated, as well as the technical-material and human resources necessary for the proper functioning of the production process; In order to achieve what needs to be done, preventive measures should be taken in advance if quality products are to be obtained; The documentation and technical specifications must be complied with în order to manufacture correctly; In order to execute correctly in the same way every time, there must be a way of control, that is to discover anomalies for correction.*
In the garment industry, the situation is more difficult due to the large number of features because the products are complex and the problems that may arise must be estimated. So even for different activities regarding quality some experiments were made which proved that the human error can also occur in the measurement results. If we check the quality controllers, we notice the subjective influence of judgment on some faults resulting from the imprecision of using control means and the non-assimilation of established procedures. After analyzing the quality problems along the technological flow in terms of both the manufacturing process and the quality of the products we make, we propose personalized solutions per product type in order to prevent and solve the problems. This analysis of the control plan regarding conformity of technological processes will improve the results of a textile garment enterprise both technically and economically.

Key words: *process, conformity, quality, stages, operation, critical areas.*

1. INTRODUCTION

Garment manufacturing is a complex industry for many reasons. The product line is a complex array of styles, seasons, varying life cycles, and multidimensional sizing [1]. Many sewn product firms are viewing the total quality management as the appropriate strategy to meet the double demand of competition and quality. Product manufacturing process is always complicated, and it's more vital point for the manufacturer to keep product quality. Producing a good quality product is a result of combined efforts of management, employees and workers by developing system, implementing good practices in shop floor and setting up standards. It is a fact that a consumer may not become pleased by purchasing a defective product. It is not always a prime factor for manufacturers to gain profit by delivering defective products to consumers, so that they become

more conscious of improving quality standards by implementing various quality methods in the production process.

A good quality product is the constant good practice and mutual fruitful efforts of all concern people like staffs, workers, and management. In many cases of control, judgment is essential. The controllers must be able to judge such issues in order to be able to take decisions to accept or reject these products. That is why in the garment enterprises to keep a technological process under control, both final and inter-phase control of certain quality deficiencies must be intensified. This paper focuses on the fulfillment of certain objectives in establishing certain control structures for the manufacture of products by presenting some criteria. [2]

Any activity carried out in garments business to improve quality must comply with the following principles:

- In order to carry out the production activity in normal parameters, it must first comply with the technical documentation elaborated, as well as the technical-material and human resources necessary for the proper functioning of the production process.
- In order to achieve what needs to be done, preventive measures should be taken în advance if quality products are to be obtained
- The documentation and technical specifications must be complied with in order to manufacture correctly
- In order to execute correctly in the same way every time, there must be a way of control, that is to discover anomalies for correction.

2. GENERAL INFORMATION

2.1. Specification of control standards for conformity of technological products

The purpose of control over the manufacturing stream is to achieve the desired quality through the following: preventive control, tracking, inspection to eliminate as soon as possible the nonconformities and defects. Any enterprise that wishes to set up a good control system and product surveillance on the manufacturing stream must select its quality control structure through a certain organization both structurally and functionally to allow setting up certain procedures:

a) Establishing control points and examining and nominating staff on technological lines in accordance with the complexity of the products being executed, so that there is a short-term relationship to possible disturbances that may occur during the manufacturing process.
b) Control products containing information on:
- Examination type (full batch verification, statistical survey of operations, product audit, process audit).
- Specify the means and control devices used.

c) Control procedures so that general activities of quality improvement do not influence în a bad way the production but help to raise the quality standard and increase labor productivity. These procedures provide data on:
- Operations that are required to be controlled
- Establishing the limits of acceptance of semi-finished products, depending on the place where we perform the control: on the production lines or at the end
- Establishing the procedure for products with non-conformities and defects
- Choosing the data to be recorded [3]

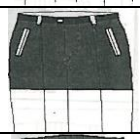
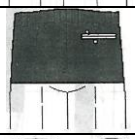
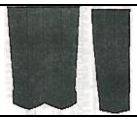
2.2.Procedure for the selection of quality examination points for operations in "critical" manufacturing areas

The following steps for selecting the critical manufacturing areas are:

a) Choosing the "critical" areas of the product that produce effects when purchasing the product by the beneficiary.

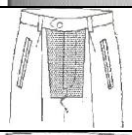
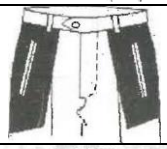
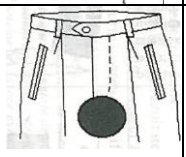
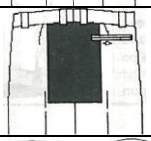
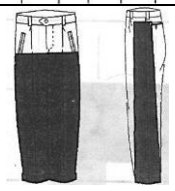
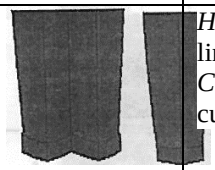
Preparing the product for launch in manufacturing with centralization operations according to already existing information in the data bank of the garment factory. Starting with the analysis of product elements, it is necessary to study distinct areas that define quality as a priority in terms of different criteria, even if at the consumer level these characteristics are rarely mentioned or even ignored. The quality level must be ensured by the manufacturer by identifying the "critical" areas of the product in the conception area, analyzing and prioritizing their qualitative level in accordance with the following aesthetic criteria, maintainability reliability, psychosensory comfort, influencing the tolerance intervals, technological documentation, technological parameters of both the equipment and the necessary devices. An example, for a pair of trousers product, critical areas (from aesthetic point of view) are seen differently in the table. 1a and b depending on the different manufacturing steps: Aesthetic implications involved in processing the product details and assembling them in a pair of trousers are found in Table 1a. [1,4]

Table 1a Audited product areas from an aesthetic point of view

Audited product area from the point of view of technological processing	**The audited product area**	Elements tracked for the area under review
Appearance of the closing system (fly)		fly line, fly spanner, decorative stitch on zipper, zipper, seating of the two sides of the fly
the aspect of front of the trousers		waistband, waistband extension, button, inner button, fly, buttonhole, hole, holes, folds, pocket on the front of the product, pocket for watch, lateral joint around the hips, stripe
aspect of back of the trousers		waistband, holes, folds, back pockets, buttons and stripe, line symmetry of the back
the aspect of the side joints (exterior and interior)		outer and inner stitching
aspect of trousers' edges		the finish line, the stitching layout
others		material faults, holes, textile scraps, tensile yarns, spots; uncut edges, lint, notations made on the product

Aesthetic implications from the point of view of the accuracy of technological processes are found in Table 1b. [1,4]

Table 1b Audited product zones from the technological processing point of view

Audited product zone from the point of view of technological processing	**The audited product zone**	**Elements tracked for the analyzed area**
waistband		the uniformity of the upper border line of the waistband; the constant width of the waistband; the accuracy of the execution of the waistband extension and the holes; correct positioning of the folds, stitches, buttons and buttonholes; symmetry of depth and positioning of the folds; the correct positioning of the sewing (hidden or visible) of the waistband back
Closing system		the uniformity of the fly line; the correctness of the key; correct application of the zipper, buttons and buttonholes; uniformity of decorative hem
Pocket on the front of the trousers		symmetrical positioning of the two cut pockets; correct positioning of counterpart on pocket bags; properly executed keys; proper pocket length; depth for pocket bags
Area of front symmetry line		the uniformity of stitching; proper stitching, without twists and strains
Pocket on the back of the trousers		corresponding positioning of the two welt pocket with constant widths; correct reinforcement of the two ends of the pockets; the correct ornamental stitch; the pocket length bag and appropriate shape
The area of the symmetry line of the back		the uniformity of stitching; appropriate aspect of stitching, without twists and strains
The outer and inner stitching area		appropriate aspect of the inner and outer stitches, even creases and strains; appropriate arrangement of decorative stitches
Edges area		*Hem end.* constant width of the reserve, uniformity of the finish line of the product, correct hidden seam *Cuff end:* correct application of the lace, constant width for the cuff, uniformity of the end, stripe
The inner areas of the trousers		the accuracy in applying the lining of the pants, the fly, waistband, the correct positioning of the emblems, the appropriate border or sewing of the reserves on the symmetryline of the back, the correctness of the waist and the uniformity of the silk band for the

		fly; on the back of the waistband
Trousers finishing		Areas, stiches, stripes

a) Definition of the critical areas of the technological process that must be kept under constant control. [5]

Following the analysis of manufacturing defects that contribute to making the product, each quality observation indicator is assigned a relative weight according to the formula.

$$F \frac{\sum_{i=1}^{n} a_i}{\sum_{i=1}^{n} n_i} \cdot 100 \quad \textbf{(1)}$$

Where:

F - frequency of faults observation

a_i - the number of products with the same fault

n_i - the number of products rejected on that day "i"

i = 1 ÷ 5 - the number of days in which returns and faults were tracked

Following this study, we set priorities to reduce the high rejection rate, the operation or phase being a critical area of the process to be kept under priority control. Daily checkpoints were established following these procedures so as to achieve a high quality level but also eliminating as far as possible nonconformities found in the phases and manufacturing operations. Procedure - team members who verify critical operations must follow each technological line with two operations as the highest rejection frequency, and a third operation with the lowest rejection frequency. In the process are established operations where several successive parts or half-finished goods (3-4 pieces) are checked several times a day. A balance sheet can be made weekly and the operations are solved when observing the inconsistencies (in these operations, phases) within acceptable limits. [6,7]

If no reduction of these inconsistencies is observed, the "critical" operation or phase will be carried out in detail and appropriate organizational measures will be taken.

a) Creating the necessary conditions for execution and verification, especially in the technological process areas considered critical that are materialized through:

- Control patterns for certain parts that trace the shape and size;
- Information that can be represented as a graph showing the correct execution and control of the respective tasks. They may be accompanied by possible incorrect variants to ensure a partnership between operators and verifiers.

In Figure 1 is shown a sketch where we can identify the main critical areas for the pair of trousers.

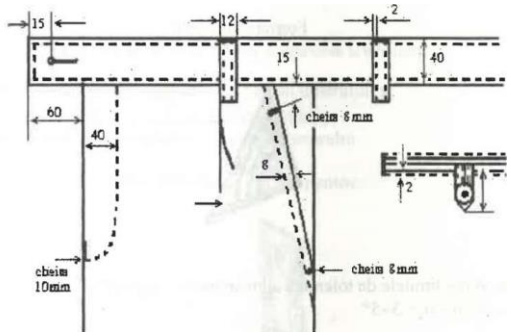


Fig.1 *The critical operation of the side pocket opening*

In order to eliminate subjectivism, there are files that contain information on the quality of operations that materialize the critical areas of the product as the main documents defining their quality. In the case of a pair of trousers, critical operations can be called slit execution, zipper application, the application of the waistband with the symmetry of the tags, the execution of the side and back pockets, etc.

2.3. Establishing specific control procedures for garment companies.

Detecting nonconformities and remedying them requires a great deal of effort on the part of the human factor and at the same time high costs even when the activity is well coordinated. In order to prevent and eliminate the deficiencies, it is necessary to properly dimension the program of quality control in the enterprises and at the same time we have to go through the following steps:

Establish an organization în charge of launching in manufacturing and tracking the technological process

a). Manage all control methods according to existing standards and appliances in the enterprise
b). Programming its own control strategy at each stage of manufacturing
c). Organization of activities, training of personnel on operations and implementation of a program for introduction into production and tracking.
d). Permanent equipment with control means and methods [7]

3. CONCLUSIONS

After analyzing the quality problems along the technological flow, both in terms of the manufacturing process and the quality of our products, we propose personalized solutions per product type in order to prevent and solve quality problems.

This analysis of the control plan of compliance with technological processes will improve the results of a textile clothing company both technically and economically.

REFERENCES

[1] M. M.Rahman, A.K.M. Masud Quality improvement in garments industry through TQM approach, Proceedings of the International Conference on Meachanical Engineering 2011(ICME 2011), 18-20 December 2011, Dhaka, Bangladesh , [On-line] https://www.scribd.com/document/236917233/Quality-Improvement-in-Garments-Industry

[2] C. Loghin ”*Tehnologi și utilaje în confecții textile*” Ed. Performantica Iași 2003

[3] I.P.Oana ”*Controlul și auditul calității*” Ed. Universității din Oradea 2008

[4] I.P.Oana, D. Oana ”*Tehnologi și utilaje în confecții textile*” Ed. Universității din Oradea 2008

[5] J.M. Juran ”*Calitatea produselor”* Ed.Tehnică București 1973

[6] C. Preda ”*Controlul calității produselor*” Ed. Rotaprint, Iași 1983

[7] E. Moisescu ”*Controlul tehnic de calitate”* Ed. ”Gh. Asachi” Iași 2000