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DEVELOPING THE ORGANIZATIONAL CONTROL STRUCTURE BY MONITORING THE TECHNOLOGICAL PROCESSES IN THE TEXTILE GARMENT INDUSTRY

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Abstract: *In order to improve quality, any activity performed in garment production enterprises, must adhere to the following principles: the technical documentation must be observed first, and also all resources necessary for the proper functioning of the production process; conformity check must be carried out to fulfill production goals in advance; the technical specifications and documentation must be implemented and for proper execution there must exist a control method, consisting in discovering defects and correct them.*
In the garment industry, the situation is more difficult because of the large number of features present in its complex products, and the problems that may arise must be estimated. Thus, for different activities in quality assurance, experiments have been carried out which show that even the measurement results can be affected by human error. The training of inspectors is important inspection requires a high level of judgment in specific cases, which can be acquired only by experience. In many inspection situations, judgment is essential. Therefore, garment manufacturers must boost inspections, in order to keep the technological process under control.
This paper focuses on meeting certain objectives in establishing certain control structures for compliance of processes, by presenting a few criteria. After analyzing quality problems along the process flow, both in terms of the manufacturing process and product quality, we propose customized solutions by product type, to prevent and solve quality issues. This analysis of the control plan for the conformity of the technological processes will improve the production of garment manufacturers, from a technical as well as economical standpoint.

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

1. INTRODUCTION

Any activity carried out by garment manufacturers, in order to improve quality, must adhere to the following principles [1]:

- in order to conduct normal production activities, the technical documentation must be observed first, and also the technical, material and human resources necessary for the proper functioning of the production process;
- conformity check must be carried out at the start or during the execution of an activity, to fulfill production goals in advance;
- in order to manufacture correctly, the technical specifications and documentation must be implemented;

- for proper execution, which flows the same way each time, there must exist a control method, consisting in discovering defects in order to correct them.

In the garment industry, the situation is more difficult because of the large number of features present in its complex products, and the problems that may arise must be estimated. Thus, for different activities in quality assurance, experiments have been carried out which show that even the measurement results can be affected by human error.

The training of inspectors is very important, but in practice inspection requires an 'extreme' level of judgment in some specific cases, also called a sense of the craft, which can only be aquired with a lot of experience. In very many inspection situations, judgment is essential, the outcome being determined entirely by that judgment. For example: for a piece of fabric containing a lot of elastane and presenting many defects in the weave, the arrangement of the templates must be adjusted, so that the minor problems occur in less visible areas. The inspectors should be able to judge such matters in order to make the decision to reject or accept those products. Therefore, garment manufacturers must boost inspections, both during manufacture and upon completion, in order to keep the technological process under control.[2]

This paper focuses on meeting certain objectives in establishing certain control structures for compliance of processes, by presenting a few criteria.

2. CONTENT

Specifying the control structures for the conformity of the technological processes:

The purpose of inspecting the production flow is to achieve the desired quality through the following: preventive control, monitoring, and inspection in order to eliminate the nonconformities and defects as early as possible.

Any manufacturer that wants to set up a good control and supervision system for the manufacturing process has to choose its quality control structure for compliance by organizing in a certain way, both structurally and functionally, to enable the setting up of certain procedures [3]:

a) Establishing some control and inspection points, as well as nominating the employees along the technological lines in accordance with the complexity of the products being manufactured, so there is a quick reaction to situations which may occur during the manufacture process;

b) Control procedures which pertain to:

- type of inspection (full inspection of the batch, inspection by statistical survey of the operations, product and process audit);
- specifying the control means and tools employed;

c) Control procedures, so activities related to quality assurance do not negatively impact production, but help raise quality standards and productivity. These procedures provide data regarding:

- operations whose control is mandatory;
- establishing acceptance parameters for semi-finished and finished products, depending on whether the inspection happens on the production line or at the end;
- establishing the procedure for products with defects and nonconformities;
- choosing which data will be recorded.

The procedure for choosing the quality control points in the "critical" manufacture areas.[4]

The following stages for determining the "critical" manufacture areas are:

a) Choosing the product's "critical" areas, which affect the product's appeal to customers.

Preparing the product for production with centralization operations based on data already present in the garment manufacturer's database, starting with an analysis of product components,

which requires a distinct study of the areas which mainly define quality, based on different criteria, even if at consumer level these characteristics are rarely noted, or are ignored altogether. The quality level must be assured by the manufacturer by identifying the products "critical" areas in the design stage, by analyzing the product's quality based on the following criteria: aesthetic, reliability, maintainability, psychosensorial comfort, effect on tolerance intervals, technical documentation, technical parameters of the tools and equipment.

For a pair of pants, for example, the critical areas (from an aesthetic point of view) is observed in a different manner (figure1a and 1b) based of different stages of manufacturing [5]:

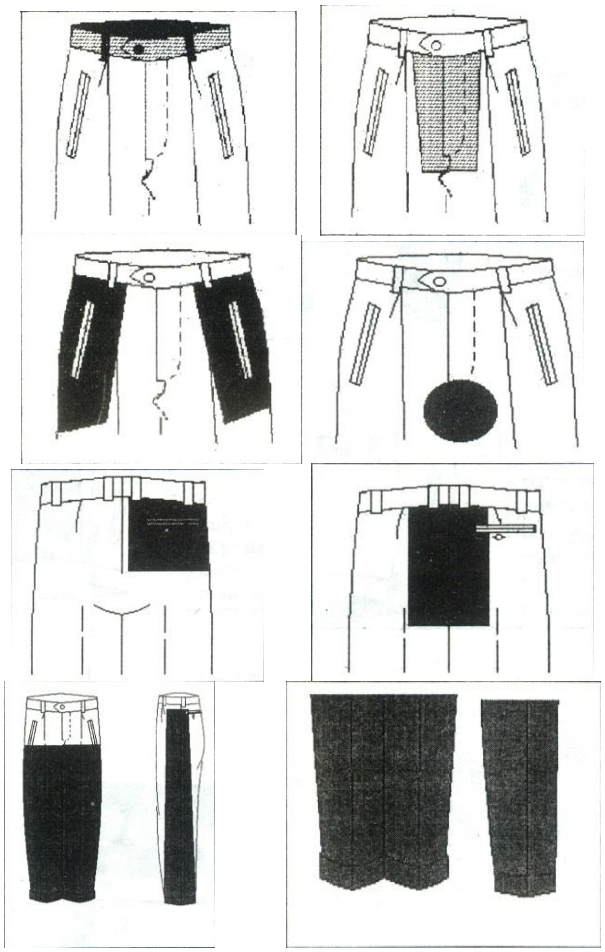

***Fig.1a**. Aesthetic implications appearing*
when working on the product details and assembling them on the pants.

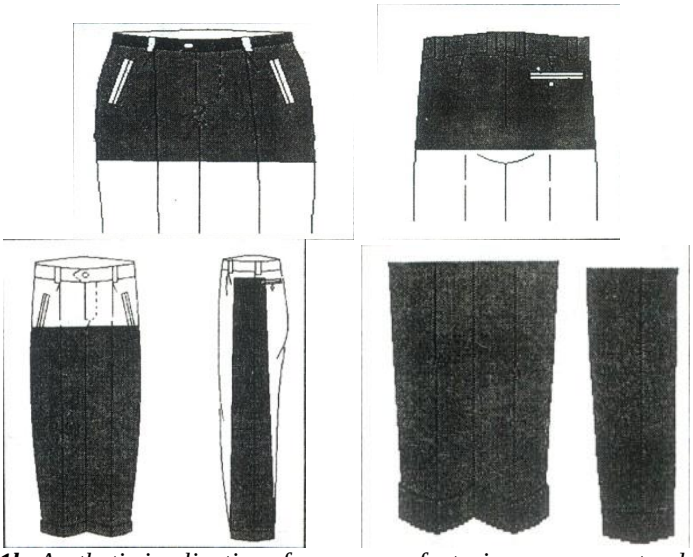

Fig.1b. *Aesthetic implications from a manufacturing accuracy standpoint*

b) Defining the "critical" areas of the technological process which must be kept under constant control.

Following the analysis of defects on the production line for the product, each quality indicator is given a weight based on the formula [6]:

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

where:

F = defect occurrence frequency

a_i = number of products with the same defect

n_i = number of rejected products on that particular day "i"

i = 1- 5 the number of days during which the number of rejected products was observed.

Based on this study we have established priorities to reduce high percentages of rejected products, those specific operations or stages being the product's critical areas which must be prioritized to be kept under control.

Daily control points were established based on the above procedure and a relatively high quality was achieved, while also constantly eliminating as much nonconformity as possible during the manufacturing operations and stages.

The team members that will inspect the critical operations must observe each technological line, two operations with the highest rejection frequency, and a third operation with a lower rejection rate. Operations within the process are chosen as inspection points, where a few succesive components (3-4 pieces) are are verified, a few times each day.

Stock can be taken weekly, and an operation can be considered fixed when the nonconformity count (during this operation) is within accepted limits.

If there is no decrease in the number of nonconformities, the operation or critical stage will be analyzed again, in detail, and the necessary measures will be taken.

c) Creating the necessary conditions for execution and inspection, especially in the critical processing areas, which materialize by:

- control templates for certain benchmarks concerned with shape and size;

- information which can be represented in a chart, to highlight the correct path of execution and control for that particular operation. May be accompanied by possible wrong options to insure the partnership between operators and inspectors.

In the final stage, the documentation regarding remedies for the observed problems is prepared. [7]

For a pair of pants, a blueprint is presented, where we can identify the main critical areas – see figure 2.

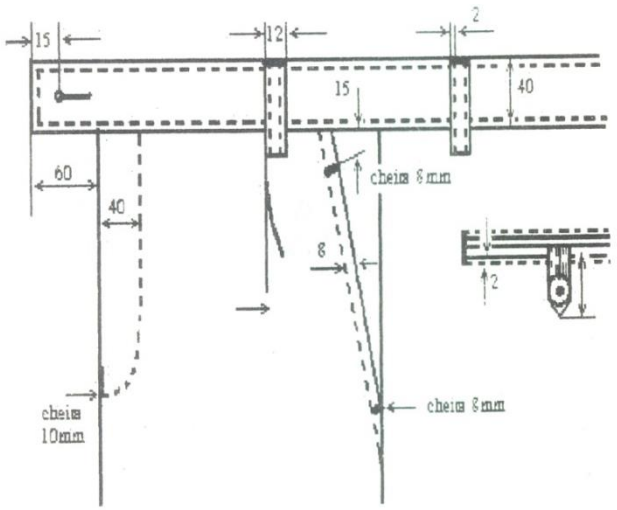

Fig.2: *Pants – critical operation – manufacturing the opening of the side pocket*

To remove subjectivity, data sheets are prepared, containing information referring to the quality of operations which form the critical areas of the product, to define the quality of said operations.

In the case of the pants, the critical operations would be the following: execution of the zipper opening, inserting the zipper, keeping belt loops symmetry, manufacture of the side and back pockets etc.

Establishing control procedures specific to garment manufacturers

Finding and fixing nonconformities requires great effort on the side of the human factor, and also high costs even when the activity is well coordinated.

To prevent and eliminate defects it is necessary to adequately size the manufacturer's quality control program and also to go through the following stages:

d) setting up an organization responsible with going into production and observing the technological process;

e) managing all control methods in accordance with standards and the tools available within the enterprise;

f) organizing activities, training the employees grouped by operations and establishing a program for entering into and observing production;

g) acquiring quality control tools and means.

5. CONCLUSIONS

Following an analysis of the quality problems occurring in the technological flow, from a manufacturing process standpoint as well as a product quality one, we suggest specific solutions for each type of product, in order to prevent and solve quality problems.

This analysis of the control plan for conformity of the technological processes will improve the results of a garment manufacturer, from a technical standpoint as well as an economical one.

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