

TECHNICAL UNIVERSITY NORTH



FACULTY OF APPLIED SCIENCE ENGINEERING INDUSTRIAL ENGINEERING

TECHNICAL REPORT

TOPIC

"IMPLEMENTATION OF STATISTICAL QUALITY CONTROL IN ANGIE
APPAREL COMPANY IN THE HEAT PRODUCTION LINE FOR
IMPROVING THE PROCESS AND PRODUCTIVITY"

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IMPLEMENTATION OF STATISTICAL QUALITY CONTROL IN ANGIE APPAREL COMPANY IN THE HEAT PRODUCTION LINE FOR IMPROVING THE PROCESS AND PRODUCTIVITY

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SUMMARY

This project has been developed to solve a set of quality problems that were affecting the company Angie Apparel, and they did not have a system of statistical control for quality used in the production system, which the company had a lot of waste of raw materials and the finished product mostly with defects sectional variability.

KEYWORDS: Quality, Capacity, Statistical Control, Court, Stability Indices, Process, Productivity, Variability, Variable Control Reviews.

1. INTRODUCTION

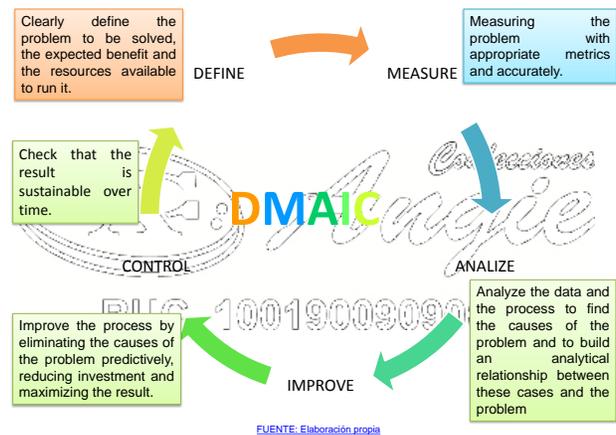
The Statistical Quality Control is a global technique that will allow the company to improve their expectations, either in capacity, productivity in the economy and the stability of it. It is considered that the control system for quality statistical benefit the company, to be able to compete with other clothing companies, and help in the economic, social and cultural development of their surroundings.

The importance of statistical control for quality within the firm, is aimed at customer satisfaction. It is an opportunity to insert products new niche markets. With the implementation of statistical quality control in the company Angie Apparel, may help decrease waste, inventory, improve process capability and productivity.

2. THEORETICAL FRAMEWORK

2.1 DMAIC Methodology

- Define
- Measure
- Analyze
- Improve
- Control

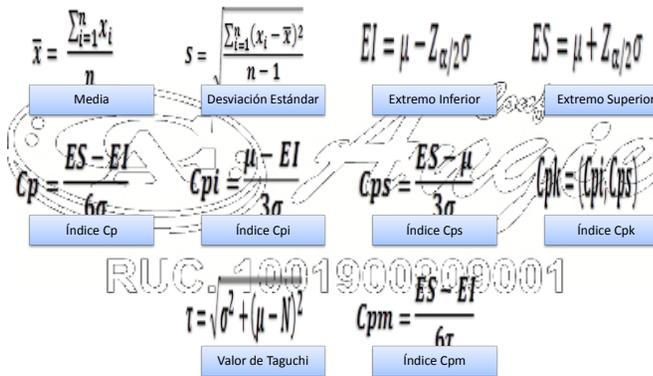


2.2 Overview of Six Sigma

Six Sigma (SS) is a strategy of continuous improvement of the business that seeks to find and eliminate the causes of errors, defects, delays in business processes, focusing towards those aspects that are critical to the customer. Six Sigma strategy relies on a highly systematic and quantitative methodology directed to the improvement of product quality or process, has three priority areas, customer satisfaction, reduced cycle time and reduced defects. The goal of Six Sigma, which gives the name, is a process to achieve Six Sigma quality, ie, processes that generate than 3.4 defects per million opportunities.

2.3 Application of the Methodology

To identify system failures within the production process heaters was calculated capacity of the cutting process with the help of the following equations:



FUENTE: Humberto Gutiérrez Pulido-Control Estadístico de Calidad y Seis Sigma (Capacidad del Proceso)

To calculate productivity use the following equations:

$$Productividad = \frac{\text{Unidades producidas}}{\text{Insumos empleados}}$$

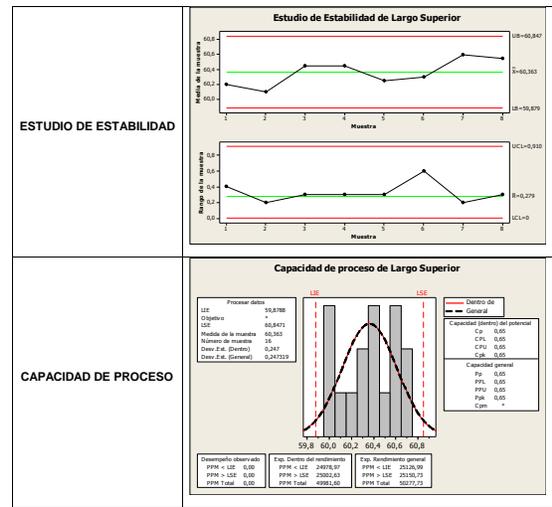
$$Productividad = \frac{\text{Salida}}{\text{MO} + \text{Material} + \text{Energía} + \text{Capital} + \text{SS}}$$

STAGE SET

The problem is that there is much variability in cuts pieces of heaters that are far from their nominal value and in some cases out of spec. This results in heavy losses of raw material (fabric), with a consequent increase in the cost of production; inequality in the final garment, giving customer nonconformity, and increased cycle time.

PHASE MEASURE

We measured the capacity and stability study giving general results:



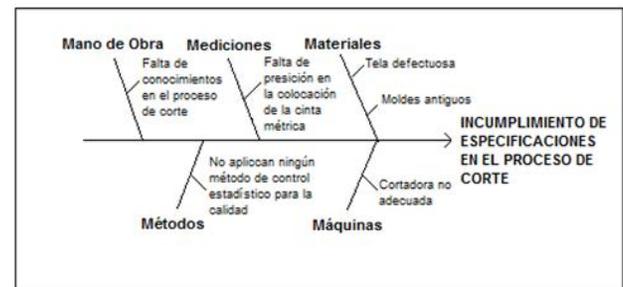
The current process is very unstable and incapable, so to improve their situation must be taken into account the recommendations made to improve the process capability and stability is adequate. The lower and upper specification are far from the nominal value, we reduce them to a minimum to avoid high levels of waste.

Productivity giving initial results:

Productivity Monofactorial = 4,931 \$
Productivity Multifactorial = 2,102 \$

ANALYZE PHASE

Cause Effect Analysis



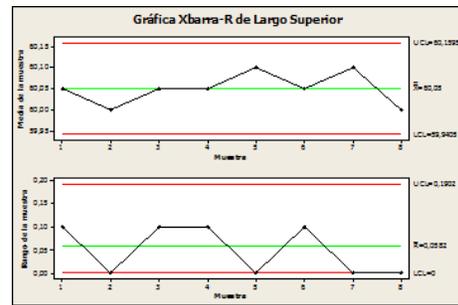
One of the hypotheses is that the excess variability is due to bad cuts cutting method applied by staff, if you create a new method, machines and materials that result in values close to the nominal value.

IMPROVE PHASE

Improvements Implementation:

- The layout of the design will be done in the computer system design Bold Software, this service is performed by a company of design and pattern of PUCE-SI.
- Implementation of a car fabric that allows a good tended to avoid errors.

- Rest of fabric, and you need that to relax and not shrink when cutting.
- Stapling of strokes, to avoid inequalities and mold movement previously used.
- Labelling and revised, this process can identify if errors in court and give way to the next system, or if the case does not suit or other piece of smaller or larger size if applicable.

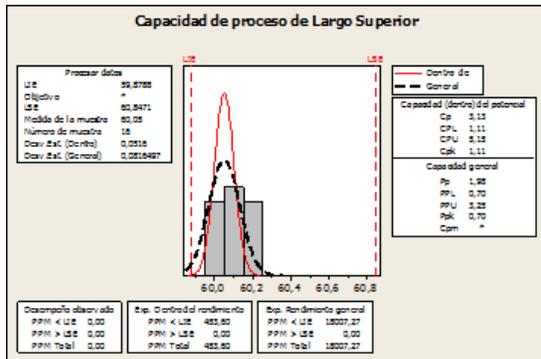


The calculated control charts show us that the process is more stable, the specifications have been reduced thus approaching the nominal value by reducing the variability in some parts values are outside the specifications, but we must take into account that these are the specifications initial state, in order to demonstrate the improved stability of the process.

3. CONCLUSIONS

The results of the capability indices we demonstrate that implementations are successful accomplishments, as they meet specifications and cutting Gauss bells have fallen sharply. The improved capacity meeting the objective of this study.

- They identify the different needs and requirements regarding the company needed to Statistical Quality Control, which have been included in the improvement process. These requirements were primarily improving the capacity and productivity.
- Was investigated various controls and existing techniques that are applied in the manufacturing sector, and have been implemented giving benefit to the company. Implementations made were: acquisition of garment design service in bold and printing these on plotter, purchase of a car to lay table cloth, the cloth hanging process, stapling fabric design lines and labeling revised cut pieces.
- Provided the elements necessary to systematize the company, favoring productivity and process capability. These elements are the tools of quality control charts and a new method in the cutting process.
- Consolidated the information in a logical and systematic, providing a structured system of statistical control. With the help of control charts allows us to identify process stability and capability indices that help us to check that the process meets the specifications given.
- We have designed a system of statistical quality control in the company "Confections ANGIE" with an easy to apply methodology. Together with the Minitab software 15 which allows us to quickly develop the capability study, productivity and calculating a simple and understandable way for people who are involved in the process of garment heater this company.



And productivity improved:

$$\text{Productivity Monofactorial} = 6,164 \$$$

$$\text{Productivity Multifactorial} = 2,836 \$$$

PHASE CONTROL

To maintain the improvements in process performance cutting measures were implemented easy to use in order to properly control the variable operating conditions proposed. Letters also were implemented control means and ranges, based on four samples per day, to monitor the behavior of the process.

Below are the letters \bar{X} -R for the variable cut during the first days of operation of the process under the operating conditions encountered.

4. RECOMMENDATIONS.

- It is recommended to maintain the improvements, it is indispensable that the people in charge do the method, since they are responsible for the process to keep improving process capability and productivity of the system.
- We recommend hiring a fashion designer who manages the specific software, since by the time you buy this service from an external company.
- It is recommended that the study of statistical control for quality in all areas of the company, in order to achieve total quality business.
- We encourage local companies to establish such studies as the solution of existing problems.
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