# *Understand and Correct the Weight Variability in Cases*

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***Abstract*** *– Process variation in all manufacturing processes will reflect a manufacturing production losses since these variations reflect process waste. Understand process variations and process capabilities is a key factor when a product is built at the production area. This project will focus to understand the process variations of an operation that have actually a total of 46.8% of cases out of weight. This percentage represent a rework operation in this process. At the end of the project, recommendations and conclusion were found and also all actions that were taken that contributes for a result of 47% of reduction in the rework area. Also, it will be understanding the contributions factors for the variability*

***Key Terms –*** *Cases, Continuous Improvement, Lean, Process Variability, Six Sigma.*

## INTRODUCTION

A textile manufacturer in Humacao have two operations in the facility; one operation is to knit the blanks and the other facility is to complete the dyeing process. When a new style will be introducing, the Product Development department of the knitting facility determine the weight of the units and establish a standard weight per each style. The group needs to send all the standard information (this include the weight) to upload it in the system. Once this information is complete, the engineering team determine the amount of units that require one case in order to have at the end of the process 42 pounds. Actually, the plant has an opportunity in terms of between actual pounds' differences founds in the product that causing a process and material variances. A complete investigation and analysis should be performing in order to understand these variations and identify the possible variables that affect this process.

## RESEARCH DESCRIPTION

Once the cases are completed (knit) the units were transfer to, dyeing process and weight requirements by case is 42 pounds with a tolerance of +/- 1 pound. Since both processes requires same weight, at the end of the knitting process all cases weight should weight from 41 to 43 pounds. Actually, it is that 46.8% of the cases that was complete at the end of the process do not meet the weight requirements. When the operator weights the product, they need to add/remove units in order to get the 42 pounds. In terms of the system in order to have the finance absorption at the end of the process the cases need to weigh 43.78 pounds since a 3% of the waste is add to the product weight standards. If the actual weight is not the same of the standard the plant will have material usage variances since the system will use a different amount of the raw material. In addition, is a fact that unit's discrepancy affects the process since needs to add a rework operation after the case is complete.

## RESEARCH OBJECTIVES

The main objectives of this research will be as follow:

- Identify variables that impact the process
- Determine the variables that needs to be controlled
- Reduce 20% of rework process at outgoing operation

## RESEARCH CONTRIBUTIONS

The contributions from this research is to provide to the company a predictable process since at the end of the project the variables that impact the weight of the product can be monitor in order to reduce the out of the weight cases. If the variable affecting the process can be monitor, the rework operation will be reducing since it is not necessary to verify the quantity of the cases. At the end of the

project, we will see lower costs, a reduction of rework process and a reduction of wasting time.

## LITERATURE REVIEW

The process variation in all manufacturing processes reflect manufacturing production losses. Understand process variations and process capabilities is a key factor when a product is built at the manufacturing area. This investigation will focus to understand the process capability of build units of the same style/size with the same weight. Also understand the contributions factors for the variability.

## BACKGROUND

Generally, products/ parts have variations in all manufacturing process and that is the reason of the importance of monitor a process and understand all the possible variables. That is the reason of why this investigation was complete. Actually, the textile manufacturing main product is the knitting and dyeing of female intimates' products. At the beginning of the process all yarn is received and storage in a warehouse. When a specific style need to build an order is place to the production floor. Then the machine is set up with program specification by style/size. An operator needs to set the counter of the machine as per the Work Order (WO) indicate. For example, an order was received for 340 pieces the operator need to set up the machine for those 340 units. All of these units are placed in a carton box and at the end of the process the total weight of the box with all the products need to have a weight of 42 (+/- 1) pounds. Currently, it was found that the process does not consistently meet this specification. The figure 1 below show the percentage of the rejected boxes at the end of the process from data that start collected 13SEP16 thru 23SEP16.

As a preliminary analysis weight data was taken from different machines in order to understand weight variability and was found that the weight from different machine assignments were different (Refer to figure 2 for a Box Plot Chart that represent the weight variations per machine). By definition the variability refers how "spread out" a group of scores is. In addition, variability could be defined in terms of how close the scores in the distribution are to the middle of the distribution. This concept of controlled/uncontrolled variation is important in determining if a process is stable. A process is defined as stable if it runs in a consistent and predictable manner. This means that the average process value is constant and the variability is controlled. If the variation is uncontrolled, then either the process average is changing or the process variation is changing or both. The first process in the example above is stable; the second is not [1].

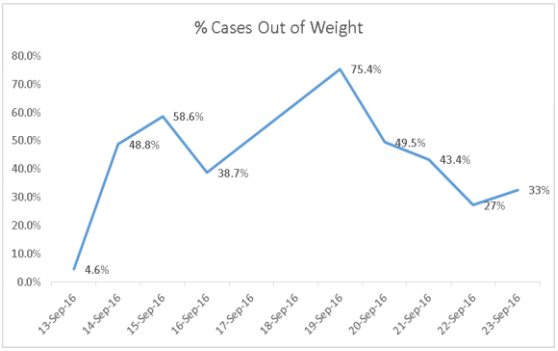



**Figure 1**
**Actual Percent of Cases Out of Weight**

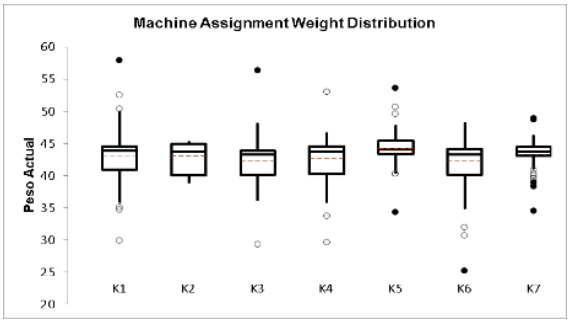



**Figure 2**
**Machine Assignment Weight Distribution**

Also in financial terms, it is important to understand and define the correct standards in order to have the correct financial absorptions. It is important to define the correct weight standard at the beginning of the process since if the weight is not correct the plant cannot afford correct absorptions. It is important to define the standard near the actual weight at the beginning of the process. If the process

has variations and is not in control, then it is more difficult to have the correct weight of the product.

It's exist different tools to understand variability and to find the correlation variables affect a manufacturing process. During this project, the tools that were used in order to understand the process variations and capabilities are Control Charts, Process Capabilities, Test Equal Variances, Box Plots, Pareto Charts and Scatter Plots. Is important to understand from the beginning a process and that is why the first step in this project is to know if the process is capable to produce the necessities in order to help predict the performance of them. In addition, another tools that will be used in order to understand the cause and effect will be the fishbone diagram and five (5) Why's.

That is why the purpose for this project; is to understand the process variability, define if the process is capable to meets the weight specification and try to find the possible variables that can affect the weight of the units. At the end of the project if the weight variability reduction can be afford this imply a cost reduction in the plant and material variances can be minimize. Material variances will be reduced, because process will be predictable and engineering and finance standards can be determined more accurately.

## PROCESS VARIABILITY TOOLS

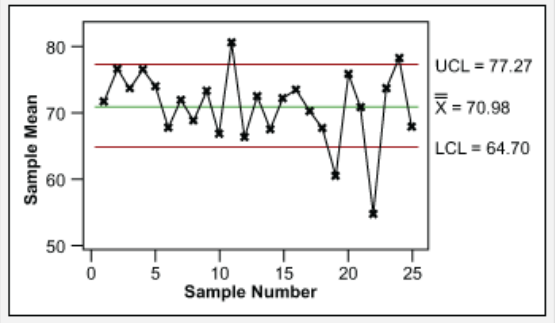
When a project is going too implemented is important to understand and measure a process in order to understand where the variations comes from. No longer, can team members go from thought to action; they have to go from thought to data to action [2]. Before analyze the process the first step will be to collect all the information that can be help for the investigation in order to take the correct actions.

## CONTROL CHARTS

The purpose of these charts is to help a team determine whether the variation shown in the data points is a normal part of the process. The correct purpose to create this type of charts is to help distingue between two types of variation: common causes and special causes [2].

Controlled variation is characterized by a stable and consistent pattern of variation over time, and is associated with common causes; refer to figure three (3). A process that operates with controlled variation has an outcome that is predictable within the bounds of the control limits. The most common application for this chart is as a tool to monitor process stability and control. Uncontrolled variation is characterized by variation that changes over time and is associated with special causes; refer to figure four (4). The outcomes of this process are unpredictable; a customer may be satisfied or unsatisfied given this unpredictability [3].

**Figure 3**
**Example of Controlled Variation**
**(Image from: Control Charts)**



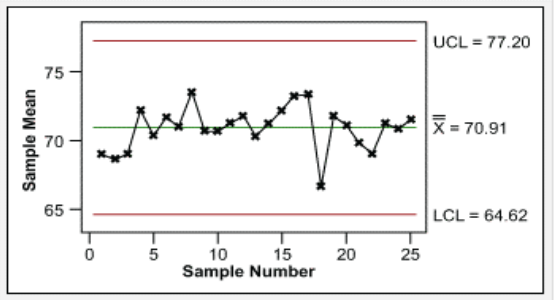




**Figure 4**
**Example of Uncontrolled Variation**
**(Image from: Control Charts)**

## PROCESS CAPABILITIES

To understand if the process is capable to meet the customer specification a capability analysis needs to be complete in order to know how the processes are from the beginning. Capability

analysis is a set of calculations used to assess whether a system is statistically able to meet a set of specifications or requirements. To complete the calculations, a set of data is required, usually generated by a control chart; however, data can be collect specifically for this purpose [4].

All methods of capability analysis require that the data is statistically stable, with no special causes of variation present. To assess whether the data is statistically stable, a control chart should be complete. If special causes exist, data from the system will be changing. If capability analysis is performed, it will show approximately, what happened in the past, but cannot be used to predict capability in the future. It will provide only a snapshot of the process at best. If, however, a system is stable, capability analysis shows not only the ability of the system in the past, but also, if the system remains stable, predicts the future performance of the system [4].

Capability analysis is an excellent tool to demonstrate the extent of an improvement made to a process. It can summarize a great deal of information simply, showing the capability of a process, the extent of improvement needed, and later the extent of the improvement achieved. These indices help to change the focus from only meeting requirements to continuous improvement of the process. Traditionally, the focus has been to reduce the proportion of product or service that does not meet specifications, using measures such as percentage of nonconforming product. Capability indices help to reduce the variation relative to the specifications or requirements, achieving increasingly higher Cp and Cpk values [4].

## TEST EQUAL VARIANCES

Paired sample t-test is a statistical technique that is use to compare two population means in the case of two samples that are correlated. Paired sample t-test is use in 'before-after' studies, or when the samples are the matched pairs, or when it is a case-control study. For example, if a training is complete in a company to an employee and want to know whether the training had any impact on the efficiency of the employee, the paired sample test can be use. How is complete is that need to collect data from the employee on a seven scale rating, before the training and after the training. By using the paired sample t-test, statistically conclusion of whether or not training has improved the efficiency of the employee. In medicine, by using the paired sample t-test, it can figure out whether or not a particular medicine will cure the illness [5]. For this investigation, this test can be used to understand if the weight of the blank change from a period time.

## BOX PLOTS

The box-and-whisker plot is an exploratory graphic, created by John W. Tukey, used to show the distribution of a dataset (at a glance). The box plot, although very useful, seems to get lost in areas outside of Statistics [6]. In addition, a basic graphic tool displays centering, spread and distribution of a continuous data. This plot provides 5 point of summary data as follow [7]:

- The box represents the middle 50% of the data.
- The median is the point where 50% of the data is above it and 50% below it. (Or left and right depending on orientation).
- The 25th quartile is where; at most, 25% of the data fall below it.
- The 75th quartile is where, at most, 25% of the data is above it.
- The whiskers cannot extend any further than 1.5 times the length of the inner quartiles. If you have data, points outside this they will show up as outliers.

## PARETO CHARTS

A Pareto Chart is used to graphically summarize and display the relative importance of the differences between groups of data. Also this is a simply bar chart in which each bar represents the relative contribution of each cause or component to the total problem, with the bars arranged in descending order of importance [8]. The correct method to be constructed by segmenting the range of the data into

groups (also called segments, bins or categories). For example, if a business was investigating the delay associated with processing credit card applications, the data could be grouped into the following categories [8]:

- No signature
- Residential address not valid
- Non-legible handwriting
- Already a customer
- Other

The left-side vertical axis of the Pareto chart is labeled Frequency (the number of counts for each category), the right-side vertical axis of the Pareto chart is the cumulative percentage, and the horizontal axis of the Pareto chart is labeled with the group names of the response variables [8].

Then need to determine the number of data points that reside within each group and construct the Pareto chart, but unlike the bar chart, the Pareto chart is order in descending frequency magnitude. The user defines the groups. In the figure five (5) it can find an example for a Pareto Chart [8].

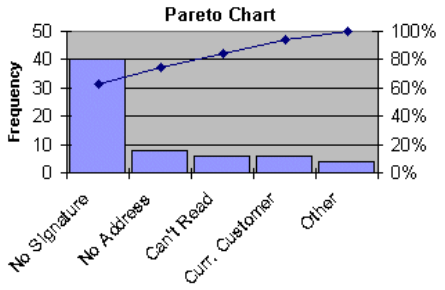



**Figure 5**
**Pareto Chart Example Graphic**
**(Image from: Pareto Chart)**

## SCATTER PLOTS

A Scatter Plot is a chart that use to see relationship with two variables. The variables that were plot are in the X and Y-axis and visually it can see the relationship with these set of data. The strength of correlation on a Scatter Plot can be measure using a Correlation Coefficient, which name as Pearson's index. This index aim to quantify the relationship and the range is from -1 to +1.

- -1.0 is a very strong inverse relationship.
- 0 indicates no relationship.
- +1.0 is a very strong direct relationship.

## ROOT CAUSE ANALYSIS TOOLS

The Root Cause analysis that is complete in order to understand the real cause that affect the process. It is important to find the real causes that influence the process, since these are the variables that a process and then needs to perform a process monitoring in order to have the process in control. It's exist different tools in terms of this investigation two tools were used in order to find the root cause. These are the Fishbone Diagram and the 5 Why's tools.

## FISHBONE DIAGRAM

Dr. Kaoru Ishikawa, a Japanese quality control statistician, invented the fishbone diagram. Therefore, it may refer to as the Ishikawa diagram and it as a cause and effect diagram. The fishbone diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects. Because of the function of the fishbone diagram, it may be referring to as a cause-and-effect diagram. The design of the diagram looks much like the skeleton of a fish. Therefore, it is referred to as the fishbone diagram [9].

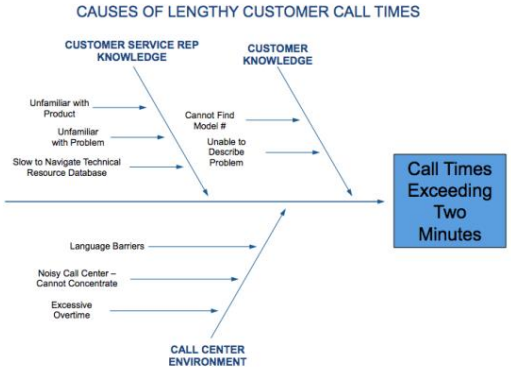



**Figure 6**
**Fishbone Chart Example [10]**

Whatever name that will be choose, that the value of the fishbone diagram is to assist teams in

categorizing the many potential causes of problems or issues in an orderly way and in identifying root causes [9]. When this diagram is complete, the project team needs to define the effect and in the skeleton of the fish need to place the possible causes that have the contribution for the effect. Refer to the Figure 6 for an example of this fishbone diagram.

## 5 WHY'S

Asking "Why?" may be a favorite technique of a three-year-old child in driving the parent's crazy, but it could teach a valuable Six Sigma quality lesson. The five Whys is a technique used in the Analyze phase of the Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) methodology. A great Six Sigma tool does not involve data segmentation, hypothesis testing, regression or other advanced statistical tools, and in many cases can be complete without a data collection plan [11].

By repeatedly asking the question "Why" (five is a good rule of thumb), it can peel away the layers of symptoms which can lead to the root cause of a problem. Very often, the ostensible reason for a problem will lead the team to another question. Although this technique named "5 Whys," it can may find that maybe need to ask the question fewer or more times than five before you find the issue related to a problem. As follow is, explain how to use this technique when using the 5Why's tool [11]:

1) Write down the specific problem. Writing the issue helps, you formalize the problem and describe it completely. It also helps a team focus on the same problem.
2) Ask why the problem happens and write the answer down below the problem.
3) If the answer you just provided does not identify the root cause of the problem that you wrote down in Step 1, ask why again and write that answer down.
4) Loop back to step three (3) until the team agrees that the problem's root cause is identifying. Again, this may take fewer or more times than five Whys. The last answer will be the real root cause for the problem/effect. When a root cause is determine then the team needs to work to implement actions to eliminate the cause that gives variations or discrepancies in a process.

## METHODOLOGY

The process variation in all manufacturing process can be reflect a manufacturing production loss. Understand process variations and process capabilities is a key factor when a product is builds in a manufacturing area. For this investigation, tools for of Six Sigma will be use in order to complete statistical analysis to understand process variations and what variables were affect the process in terms of product weight. To understand the variation a data will be collected and analyze. Out of weight, data will be collect; this data comes from a daily report at the end of the knitting process. All cases out of weight are documented and with this information the study will start, then another data will be collected for major offender style that will be identify. Also at the end of this chapter, a Project Plan will be present in order to present a detail of each activities.

## PROCESS VARIABILITY TOOLS

Six Sigma offers a variety of tools to complete a process analysis to understand variables that affect a process. It is important to understand what tools and the type of analysis that will be complete for this project the following analysis will be use in order to understand product weight variability:

1. ***Control Charts:*** By applying this tool during this project will help to determine possible variations of the blank weight. The weight of the blank will be collects for one specific style and this chart will be help to know if the weight is stable. In addition, it can be understand what types of variations have the process if it is by common or special causes. Using this chart will let know the team if the weight is stable over a period time.
2. ***Process Capabilities:*** Will be used to understand if the process is capable to meets the requirements and how much variation have the

process. A data will be collected and segregate by styles and sizes in order to study one specific size. In order to know what style will be monitor a Pareto Chart will be completed with all the data of out of weight. This data will analyze and the style that reflect more variation will be study and monitor per a period.

3. ***Test Equal Variances:*** Paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated. This chart will be used to understand if the blank weight change over a time period. It can help better to know if the weight of the same blank is affect with the period time. A total of 30 units will be weight and document each blanks, then these products will be placed on a bag and after 3 days the same blank will be weight, then we can know if the weight change over a period time.
4. ***Box Plots:*** The purpose for this tool is to know if the weight change in different machines. The same style will be set up in a machine and then the weight of the product will be collected and used this tool to understand and identify if the weight is different in each machines. This can help the team to investigate if the machines set-ups are different per each machine and try to find why the differences.
5. ***Pareto Charts:*** This tool will be used to identify the major offender of styles in order to know which style will be analyzed with all the possible variables that can affect the process. Since this is a simply bar chart in which each bar represents the relative contribution of each cause or component to the total problem, with the bars arranged in descending order of importance it can be determine the major offender.
6. ***Scatter Plots:*** This tool will be used in order to write down all possible variables and then understand what variable affect the process. In addition, it is used to understand the relationship for two variables it can be know if have a positive or negative relationship.

## ROOT CAUSE ANALYSIS TOOLS

The Root Cause analysis will be help in order to find the real causes that impact the weight of the product. It is important to complete a complete analysis in order to find the real cause that affect the weight of the product. If the real cause does not eliminate then the variations cannot be solved. The following tools will be used in order to complete the investigation:

1) ***Fishbone Diagram:*** Will be used during a kaizen event in order to give the opportunity to the project team list all possible causes that affect the process. Then an exercise with the five why's tool will be completed.
2) ***5 Why's tools:*** Also another tool that will be used during a kaizen event with all members of the project team. With this tool the team needs to start ask why's until the real cause were identify.

## PROJECT PLAN

Below is the project plan to work in this project in order to assure the results can obtain at the end of the project. This plan includes all activities that was develop and completed during the project in order to assure the process is in control and a reduction of cases out of weight were corrected.

HANES Brands Inc — ACTION PLAN

Project: Weight Variability | Leader: Jessica Albino | Scope | % Complete: 100% | Year

| NO | Action Plan / Milestone | Responsible | Date | Apr | May | Jun | Jul | Aug | % Complete | Progress |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Project Description | J. Albino | Oct-16 | | | | | | 100% | |
| 2 | Collect Data Plan | J. Albino | Oct-16 | | | | | | 100% | |
| 3 | Complete Statistical Analysis to understand process variables | J. Albino | Nov-16 | | | | | | 100% | |
| 4 | Realize Kaizen event in order to find the root cause | Team | Nov-16 | | | | | | 100% | |
| 5 | Complete Root Cause Analysis | Team | Nov-16 | | | | | | 100% | |
| 6 | Potential Solutions | Team | Nov-16 | | | | | | 100% | Solutions was gennated during the kaizen event and on a daily basis in order to assure proper actions were taken |
| 7 | Eliminate the currect tare and use the box in order to complete the tare and take the weight of the case | Supervisors | Jan-17 | | | | | | 100% | |
| 8 | Conduct an analysis of the currect cases that production use in order to tare the balance | J. Albino / J. Aquino | Jan-17 | | | | | | 100% | |
| 9 | Asure that in production floor all measures were taken when a repair was complete in the machine | H. Camacho | Jan-17 | | | | | | 100% | |
| 10 | Evaluate the method between quality, mechanics and operators that follow in order to assure all people use the same method | H. Camacho | Jan-17 | | | | | | 100% | |
| 11 | Implement a daily report in order that all people have the same information and start to create involment with all positions | Team | Jan-17 | | | | | | 100% | |
| 12 | Control Phase in order to assure actions implemented are aligned with expected variables | J. Albino | Feb-17 | | | | | | 100% | |

**Figure 7**
**Project Plan**

## RESULTS AND DISCUSSION

Thru this section of the article the results and conclusion will be presented in order to reduce que

quantity of cases out of weight. It will be start with the understanding the process until present the results.

## START TO UNDERSTAND THE PROCESS

When a process needs to improve the first step is to understand how the process is run, the following chart demonstrate the percent (%) of cases out of weight from 14SEP16 to 30NOV16. This chart let us know the process behavior, in average the process has 41% of cases that were reject (also known as rework) at the end of the process when cases were complete and demonstrate the process variation.

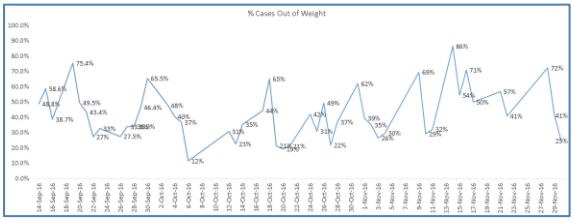



**Figure 8**
**Data Collected Cases Out of Weight**

The data was collected from the production floor and is the real information from the cases out of weight. A kaizen event was complete in order to understand the issue and try to define possible solutions for a reduction of cases out of weight. As previous activities before the kaizen event, different information was collect and analyze in order to present to the team to identify possible root cause and solutions. It is also implement as part of the operations daily management a daily follow up with styles that are major offender and from the line, which comes that case out of weight. The purpose for the daily follow is to create conscience of the magnitude of the discrepancy.

In order to understand the current process and where the team will be, focus an IPO (Input, Process, and Output) Diagram were used. Refer to the figure 9 for the diagram. This diagram helps the team to understand the input and output variables of the process and to determine where was important.

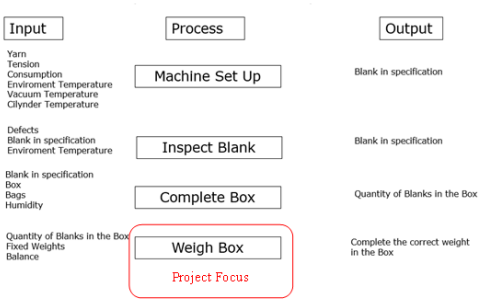



**Figure 9**
**Input, Process, Output Diagram**

## IDENTIFY MAJOR OFFENDERS

Data started to collect with the machine number from was rejected, the style and size. This exercise call stratification and is refer to dividing the data groups based on different characteristics since its come from several sources. In order to start to identify the major offenders of the styles and the machine assignment a Pareto Chart (figure 10) was used. It found that the major offender comes from styles J103, 1F69, X803 & 2803. Another Pareto Chart that complete are to segregate the machine assignment (figure 11) from where the case is build. The machine assignment comes from the production groups those haves actually the machine layout. It found that the top 3-knitter machine assignment comes from K6, K1 & K3. This information helps to determine where the team need to analyze and complete an investigation on the machines set up and the counter use in the production floor.

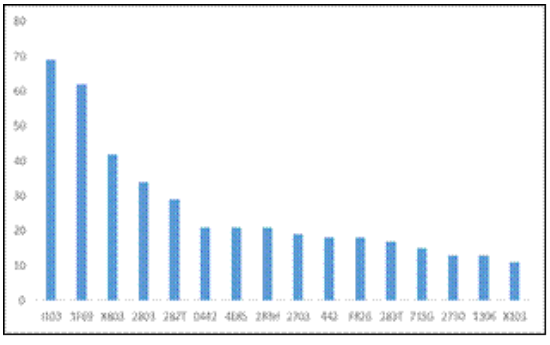


**Figure 10**
**Pareto Chart for Major Offender**

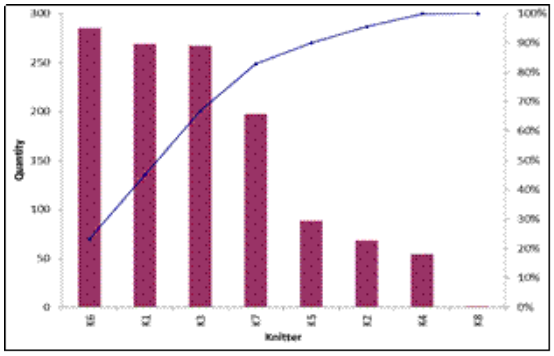



**Figure 11**
**Pareto Chart Knitter Assignment**

The two charts helps the team understand from where comes the major cases out of weight and define the machine assignment that needs to start understand why the cases are out of weight. Later in the project, this information is used to complete another statistics analysis in order to find the root cause for this discrepancy.

## STATISTICAL ANALYSIS TO UNDERSTAND CONTRIBUTION VARIABLES

As part of the analysis, a Run Chart was complete for one major offender style in order to understand if the weight of the blank is the same over a time and in different machines. A Run Chart was complete in order to understand if variations are in the weight. Refer to Figure 12 for the chart. It can understand that the weight of the product has variations from different machines and days.

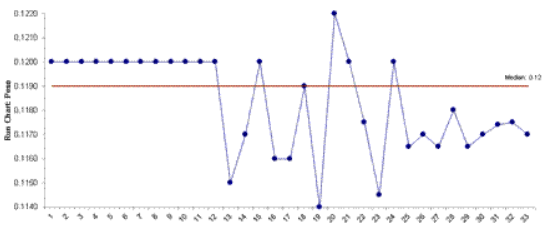



**Figure 12**
**Run Chart for One Style**

Additional Chart that was use for the statistics analysis is the Box Plot. Again it was selected a major offender style that was out of weight and take samples from different machines. This chart demonstrates that have variations per different machines. The average of the weight in different machines are not the same and also in machine 505 it was found that the data that was collected have a major variation in the same machine. This is why needs to investigate and evaluate why the variations and finds also the root cause in order to correct them and eliminate this source of variation. Refer to figure 13 for the Box Plot.

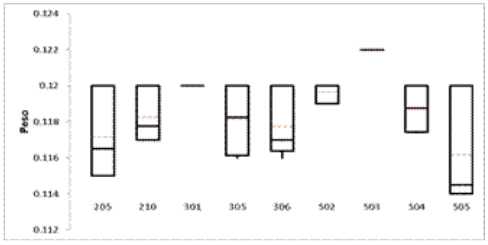



**Figure 13**
**Box Plot for One Specific Style in Different Machines**

Last tool that was use in order to identify the major contributions and the relationship between two variables is the Scatter Plot Chart and the Pearson Correlations (Refer to figure 14). For this analysis one style of the major offender start to collect the data. The conclusions that can take from these analyses are that the measures of the product affect the weight. It is means that when the X Stretch is more the weight of the blank are high and vice versa.

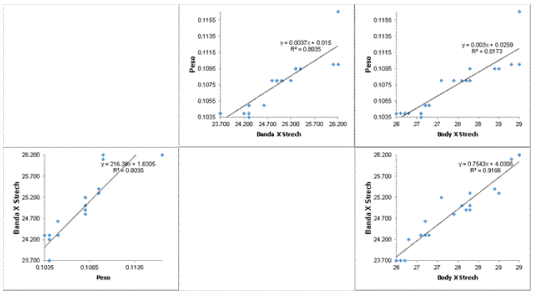



**Figure 14**
**Scatter Plot Chart and Correlation Chart**

## IDENTIFY ROOT CAUSE

After the major offender's data of are analyze it was determine that two (2) variables impact this variations. Tools that helps to determine the root cause of a discrepancy or problem was the Scatter Plot chart, it was demonstrate the X Stretch have a strong relation of the weight of the blank. If the weight of the blank is different from different

machines or day at the end of the process, the case can reject and needs to complete a rework process. This was mention during the root cause analysis that appears on figure 15. Below in figure 15 and 16 the root cause analysis identification was completed and documented.

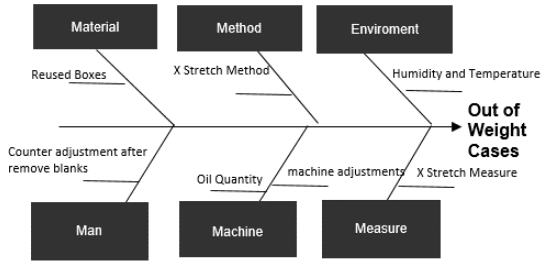



**Figure 15**
**Fishbone Diagram**

| *5 Why's* | |
|---|---|
| **Cause 1 Counter Adjustment** | **Cause 2 X Stretch Measure** |
| Why, The counter adjustment contributes of the cases out of weight?<br>At the end of the process cases doesn't have the exact quantity for the 42 pounds | Why, X Strech Measure affect the cases out of weight?<br>X Strech High means product have more yarn and viceversa |
| Why, the cases doesn't have the exact quantity?<br>Pieces are discount or added and doesn't adjust the counter of the machine | Why, have more yarn?<br>Mechanical Adjustments were complete and the machine take another parameters |
| Why, not adjust?<br>Fixer, Operators and quality personnel take or add units and doesn't complete operation | Why, machine take another parameters?<br>Because during the troubleshooting of the machine values were change and verification doesn't complete again in all shifts |
| Why? | Why, Verification are not complete in all shifts?<br>All personnel doesn't know |

**Figure 16**
**5 Why's**

The results of these project are shown in figure 17 it was demonstrating a reduction of 47% of cases out of weight. This number is more that the goal of the beginning of the project that was 20%. A daily monitoring was implemented and a discussion is that as part of the operations daily management. Figure 19 shows the template that was created in order to help all production personnel including supervisor to take correct actions.

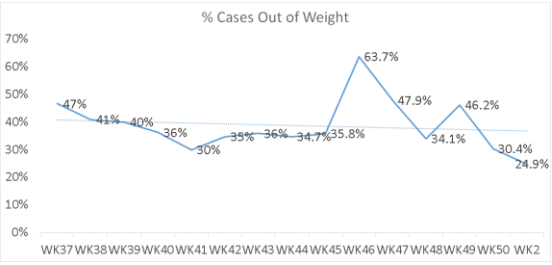



**Figure 17**
**Results after implementation**

## CONCLUSION

Using different tools helps in this project since it was provide the current situation. It is demonstrating that if a process is not in control and the variables are unknown a process cannot be improved. That is the reason that the focus of this project was primary on try to place the process in control and reduce the variability. In addition, it is important that the information is share to all correspond people in order to create awareness. The success of this project primary was that the correct information starts to share with the manufacturing operators, supervisors, quality and technical area. With this information

A daily monitoring of cases out of weight implement in order to provide information and take actions in the moment. The supervisors and group leaders start to complete a daily audit in the machine assignment that have the major cases out of weight. The audit is related to the counter in order to assure that all units that are remove from the machines are discount correctly.

At the end, the variables that affect the weight of the unit start to monitoring and assure that are in parameters. The variable that influence the process was the X Stretch, as a daily basis when a case is out of weight the group leader of the area go to that machine and take the measures if it's found out of weight the machine are corrected at the moment.

In addition, standards weight starts to control since fewer cases are out of weight and the operator does not need to change the quantity of the units in the cases. Engineering team can take the correct weight standard with less variations. A process with less variation can have a better picture to have correct values for unit weight.

As part of the lessons learn from this project is that if continue monitoring does not complete as a daily basics and the information does not share to correct person the process can't be improve. The key factor for the success of this project was that all people get empowerment.

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