



# Title: Detection of minor stoppages in the packaging area of a brewing company in the town of Tecate B.C.

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# Summary

The present investigation consisted of analyzing the packaging area of a brewery company in the town of Tecate BC, **in order to detect the root cause of minor stoppages that occur more frequently in the sub-areas through which the glass bottle passes**, and thus generate a corrective measure at the specific point where the process stops, since this has a direct impact on the useful annual production time of beer in this presentation.

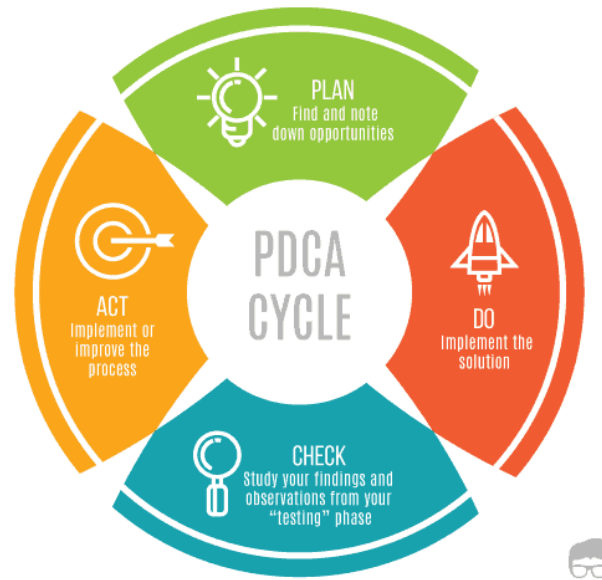
# Introduction

**Maintenance and having as few losses as possible is a challenge that is worked on every day, it is one of the fundamental axes within the industry, is quantified in the quantity and quality of production. It is an investment that helps improve and maintain quality in production.**

This document gave way to the implementation of a project aimed at detecting, eliminating and reducing situations that are the cause of minor stoppages on the L-030 line (responsible for receiving the 355 ml glass bottles, filling them, placing their respective label and packing them), depending on the presentation with which you are working) which have a duration between 1 and 5 minutes in which the production is interrupted in order to be attended and in this way continue with the production.

# Methodology

To carry out this research, the Deming Cycle was taken as a basis, which is explained in detail in section 2 of this chapter. The way in which each of its stages was developed is shown below.:



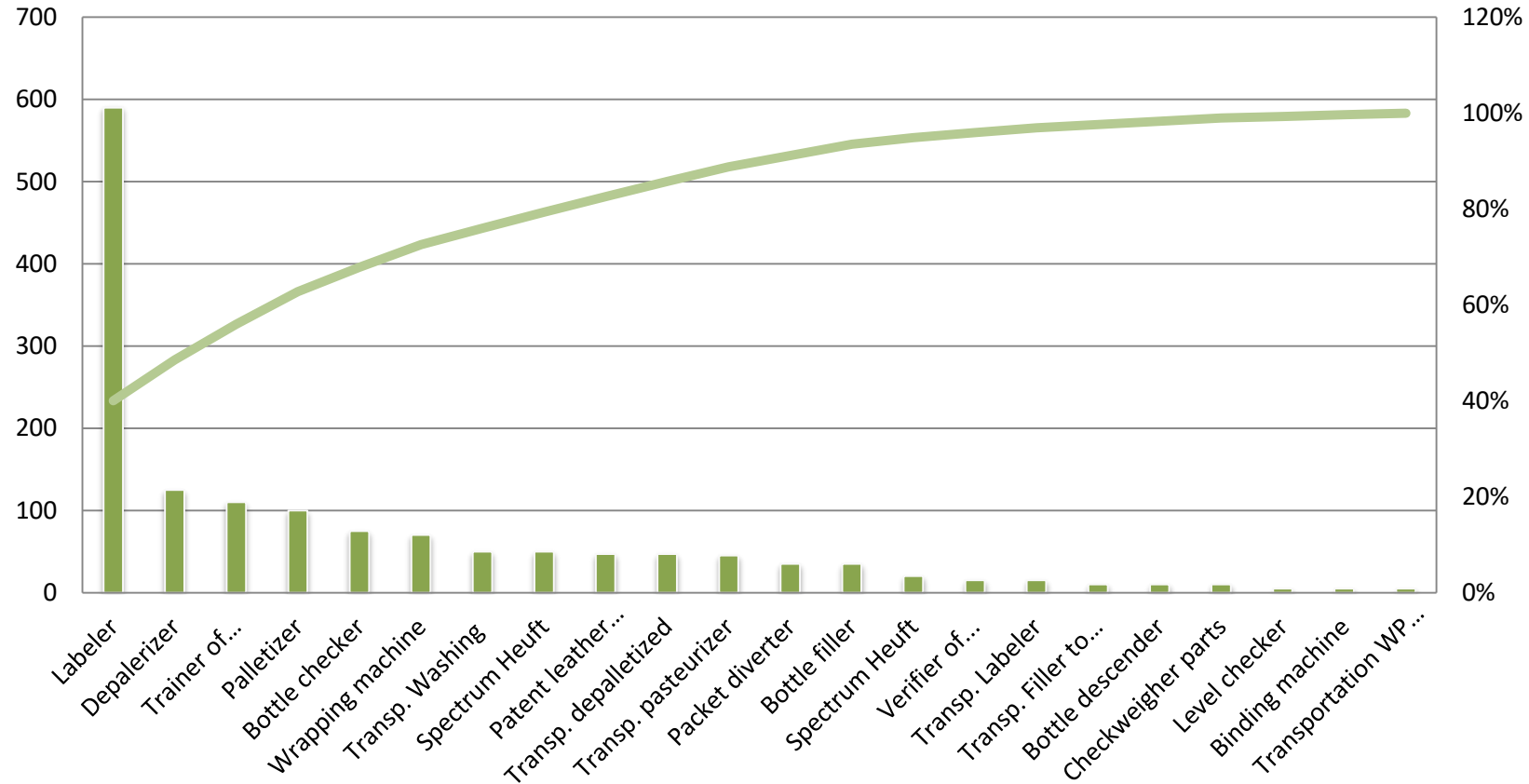
Deming Cycle. Source: Bharath Sivakumar

# To plan

First, it gave way to **analyze the information** on the minor strikes that occur in the different areas of line 30. Said information is a **fault log recorded by operators** from the beginning of the current annual period, where **recorded information about the causes** that cause minor stoppages in their respective areas, **their origin, their frequency and the time** they consume from the annually allocated available production period.

For perform a better analysis of the information, were used **dynamic tables that allowed stratifying the strikes in their different areas where they occur**. Once this was done, a Pareto diagram was drawn up (See figure 1), based on the information summarized in the tables.

Graph 3.1 Pareto diagrams showing the area with the most problem of minor strikes.



Source: self made

Through these graphs determined the main areas in which strikes occurred most frequently. These areas were the labeling machine in charge of putting the labels on both the body and the neck of the bottle. This area was selected by the maintenance manager, who was interested in solving this problem of minor stoppages.

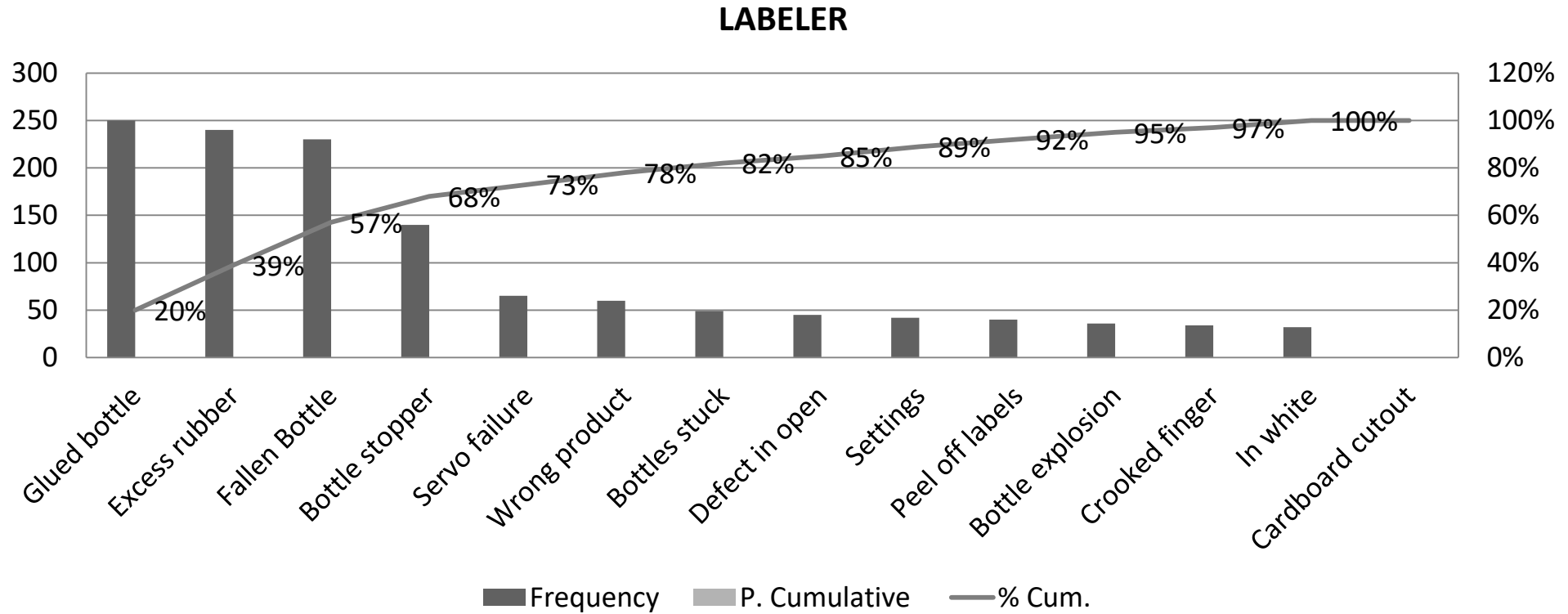
Once the area where the improvement project would be implemented has been detected, gave way to carrying out a face-to-face sampling, where the focus was in analyze **each of the areas** to verify the veracity of the log data, and in turn, **detect the presence of minor stoppages, and the exact place where they appeared**, since the areas are made up of different sub-elements and processes where these contingencies can occur.



# Do

Based on the data obtained, the next step was to make a series of Pareto diagrams showing the most frequent causes of each area. For these first, the failure modes were stratified with the areas in which they occurred, using the information from the period logs provided by the entity, see Graph 2.

Graph 2. Pareto diagrams showing the most frequent causes of each area.



Source: self made

The next step was to focus on the area where the improvement was applied, in order to filter only the causes of minor stoppages that were relevant to the project. Based on the descriptions that the operators write in the logs, they gave way to **create categories that reflect the highest priority sub-areas and failure modes with the highest frequency of occurrence.**

Once the causes that gave rise to most of the consequences were detected, the **fault recognition and detection stage.** For this **Sampling was carried out on different days and days of production** (See Table 1), with **the purpose of understanding the origin and repetitiveness of the causes of minor stoppages.** Being present in the area from the 12th of February, until the 27th of the same month.

# Table 1. Sampling Table

Registration Log Minor strikes					
Date	Hour	Presentation	Type of unemployment	stop time	Stop Reason
02/18 2019	4:10	indian exp	bottle stuck	2 minutes	excess rubber
02/18 2019	5:35	indian exp	Rubber	5 minutes	lack of rubber
02/18 2019	5:50	indian exp	misplaced label	5 minutes	Flow rate
02/20 2019	3:10	xx born	misplaced label	6 minutes	Flow rate
02/20 2019	3:23	xx born	misplaced label	4 minutes	Flow rate
02/25 2019	5:40	national indian	Rubber	6 minutes	Lack of rubber

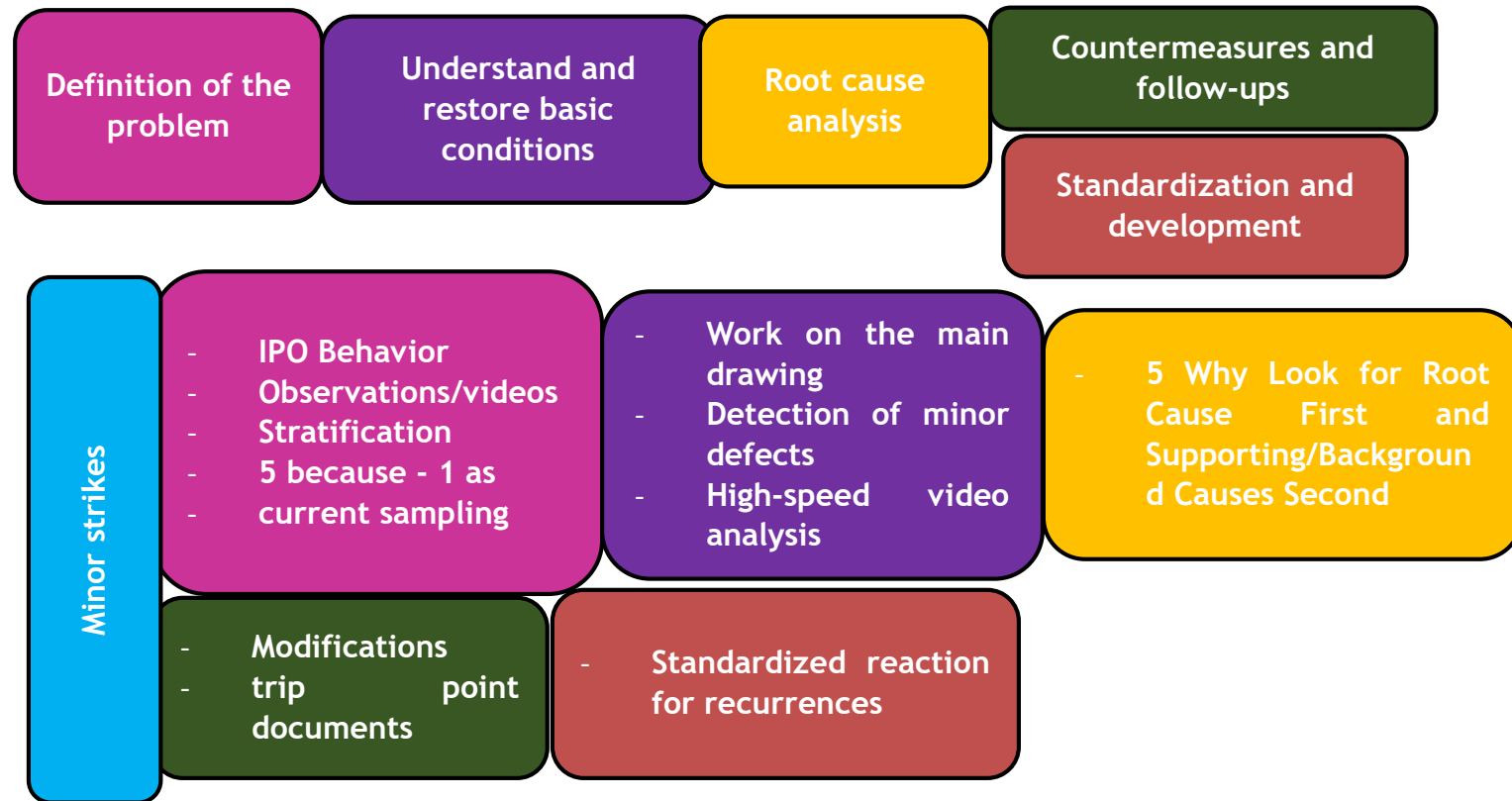
Source: self made

For the company **there are 3 different reasons why the machinery loses useful production time**, which are:

1. breakdowns of the machinery
2. minor strikes
3. loss of speed in the equipment

These cases were divided previously by the entity with the purpose of stratifying the information. As explained above, for the purposes of this investigation, the focus was the resolution of the causes of minor stoppages. For the assembly of the action plan, 5 key stages were established that allowed the development of the project (See Figure 1).

# Figure 1. Action Plan Stages Against Minor Strikes



Source: Brewing Company

# Definition of Problem

For this stage, the levels of the OPI indicator (OverallPerformanceindicator), a sample was made, which was prepared while in the areas of opportunity, once there, an observation of the line was made for 2 and a half hours.

In the event of a minor stoppage, its duration was timed, and its final duration was recorded in the sampling table that was prepared; The cause that caused the line to stop was also noted, either because of the bottle or a fault in the machinery.

In addition, an analysis was made with a video at low and high speed, and it allowed to observe the behavior of the line when there were no operators present. This analysis consisted of playing the video, observing the behavior of the bottles and detecting possible causes why they could fall or get stuck and stop the process.

# Recognition and Restoration of Classic Conditions

This phase consisted of carrying out a field reconnaissance, which was carried out by being present in the assigned line for 2 weeks in order to become familiar with it, as well as its areas, sub-areas and physically observe the causes of minor stoppages. and perform a recognition of the current state of the process and its behavior. While each area was analyzed, the registration log was filled.



# Root Cause Analysis

Once the line sampling was done, it was observed that **the most recurrent cause of minor stoppages** It was a stuck bottle and excess rubberdue to the lack of inadequate maintenance that was provided to the parts involved in putting on both the glue and the label. These parts are called Rubber Pump and Gluing Rollers.

# Countermeasures and Follow-ups

Upon determining the root cause, countermeasures were applied. Both the rubber pump and the rollersgluers they were disassembled to give it a very complete maintenance, since previously it was provided only superficially (See Figure 2).

Figure 2. Rubber Pump and Rollersgluers.






Source: Brewing Company

For this got support from the maintenance team, since it was necessary **verify and perform an uninstall** correct without affecting surrounding components. In order for said rubber pump to have good maintenance, a series of steps were carried out, which in summary consisted of **rinse, lubricate and clean the entire pump, as well as cleaning each of its hoses.** At the same time, **the rollersgluers they were provided with extremely optimal lubrication and cleaning maintenance** which helped their performances to be in the highest conditions.

# Verify

In order to create a standard that would allow the comparison between the current method and the proposed one, one of the process control tools was developed: the verification sheet (See Figure 3).

Figure 3. Check sheet

 <b>MINOR STOPS VERIFICATION SHEET</b> 		KEY CODE					
		REVIEW DATE		3/15/2019			
		No. REVISION		1			
ÁREA		ACTIVIDAD				RESPONSABLE DE	
Line 03 Labeler		Verification of minor stoppages				OP. LABELER FRONT AND OP. LABELER	
Presentation	TIME	MATERIAL AND/OR TOOL REQUIRED	STANDARD / POINTS TO CHECK			PPE NECESSARY	
XX max	N/A	Verification Sheet	1.-During the standard product run, verify Minor Stoppages.				
SCHEDULE	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	Total	OBSERVATIONS
7: 00 - 8:00							
8: 00 - 9:00							
9: 00 - 10:00							
10: 00 - 11:00							
11: 00 - 12:00							

Source: self made

Said check sheet allowed an assigned auditor or operator by the company, to **carry out a real-time sampling of the number of minor stoppages that were recorded in different periods of the day**, this with the purpose of observing if the number of minor stoppages was reduced in the areas where the improvement plans were implemented, since the objective was to create corrective measures in the face of these contingencies. At the same time, **the verification sheet allows greater control over the information on the number of stoppages, as well as the times in which they commonly occur.**

# Act

In order to carry out corrective and preventive actions that allow improving the areas of conflict, the pertinent ones were carried out Kaizen's, which in this company they consist of minor stoppage analysis sheets with an already standardized format for them, these sheets allow the failure mode to be described and reported in detail, as well as the countermeasures that will be taken for corrective action.

# Results

**The objective of this research was to implement improvements in the areas of the 030 line where there will be a greater number of minor stoppages, and thus achieve optimal use of the machinery in terms of productivity and available useful time.**

The result obtained was **creation of maintenance standards and give structure to the development of the Deming Cycle Methodology and Continuous Improvement.**

When implementing the methodology, **created information bases, such as dynamic tables and Pareto charts,** that enable operators to identify the **highest priority areas of opportunity** that have not yet been addressed, since the line has various sub-areas and in all of them there are minor stoppages that must be reduced or eradicated.



Once the **maintenance plans have been created**, the results were shared with the operators, since they are involved with production on a daily basis, and must be informed of the new standards that were created, **to form in them behaviors that promote autonomous analysis**, since the company seeks that every operator is capable of contributing ideas that are consistent with the mission and vision of the company.

With the implementation of these tools **was eradicated and markedly decreased 91% of the 285.15 minutes** that to date are accumulated by minor stoppages in the labeling machine, this **is equivalent to the economic savings of \$76,990.50 pesos mn** taking into account that currently each minute of production is valued at \$270 million pesos.

# DISCUSSION

It is transcendental to be part of the development and implementation of this type of projects, since it allows the company to continue growing and better integrate all members. Making all members part of this methodology, allows improvements to be created within the processes and in turn generates trust between them, since by being trained they acquire security for the execution of their activities. Mentioned above, it is recommended to monitor the project and maintain communication with the workers.

# Conclusions

The implement a minor strike project **allows detecting and eliminating situations that cause the line to stop for very short periods of time, but must be dealt with quickly.** Even so, unplanned production time is consumed, generating both economic and production losses. These stoppages are caused by the lack of maintenance provided to the production line. **For this reason, the adaptation of methodologies such as the Deming circle is of the utmost importance, in order to create an efficient countermeasure against these problems.**



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