Process Optimization on Rear Bumper Assembly in a PIM Two Wheels Poly Company

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Abstract

The article discusses the relevance of a proper implementation for the rear shock absorber assembly line of motorcycles in a company of Manaus Industrial Pole - PIM, considering the quality techniques and tools used in optimizations. The overall goal is to improve component distribution and rear shock mounting costs for efficiency and effectiveness in the process flow. Specific objectives are to: Avoid wasting time in the process, improve production with optimization techniques, and develop team capacity. In the problem, he observed jobs 6 and 7 with poor "distribution" of components, generating excessive spending. The question arises: How can component "redistribution" optimize and reduce costs for the business? The methodology used was exploratory research, with systematized studies through academic websites, books, bibliographic research and field research with the company with collected data. The optimization procedures were performed with the following tools: Brainstorming, Ishikawa Diagram, 5W2H and Kaizen. Therefore, this paper aims to develop knowledge about the improvements implemented in the assembly line, encouraging the application of quality tools, making it a very efficient option for the organization.

Keywords: Process optimization; Quality tools; Kaizen;

1. Introduction

The present study was conducted in a PIM company (Manaus Industrial Pole), currently the company has

approximately 650 employees. In an area of 100,403.18 m², being 37,248.65 m² of built area. The products offered and manufactured are special motorcycle shock absorbers, motorcycle spare parts and shock absorbers, two-wheeled vehicle shock absorber, shock absorber, shock absorber housing, two-wheeled vehicle upper and lower table and speaker tube. . The main customers are Moto Honda and Yamaha. Its main competitor today is Asia for its low manufacturing cost.

Employees receive various appropriate and targeted training such as basic math, metrology, mechanical technical drawing reading and interpretation, interpersonal relationships, leadership and leadership, quality tools, and so on.

The company is in the business of manufacturers of Front, Rear and Rear Gas Shock Absorbers, Upper Table, Steering Column, Rear Fork Platter, for Honda and Yamaha motorcycles, which have been customers since 1981, with the aim of expanding their business and building customer loyalty. partnership. In the company's production line, the biggest problems are in the distribution of components, bringing consequences in productivity, generating excessive expenses in the process progress. In the face of the problem, the question arises: How can the redistribution of the assembly line called the rear shock absorber, optimize and reduce costs in the company of Manaus Industrial Polo?

The overall goal is to optimize component distribution and assembly costs for the rear shock absorber on the production line, and its specific objectives are to: avoid wasting time on the process, improve production and build staff capacity.

This article is justified by the growing search for quality and improvements in such a competitive and globalized market, that is, always reducing costs in its product and its production processes. The organization sees possibilities for continual improvement and development of new work techniques, which means that the organization continually evolves in damper assembly processes, achieving better results and utilizing quality tools that will address the root causes, eliminating potential malfunctions. your products.

The main relevance of this work is to show process optimization in the rear shock absorber production line, will provide within the company, a reduction in downtime, component distribution failures and company cost.

2. Theoretical Referential

2.1 Process Optimization

Process optimization, also known as process management, is a set of actions that seeks to reduce or eliminate unnecessary expenses, whether materials, equipment or human resources. It aims to map, understand, outline, execute, measure, qualify and monitor each step of the production process.

According to [1], process optimization means reconfiguring, changing its rules and procedures, usually with the use of new technologies to make them more expeditious, reliable, cheap, flexible (able to incorporate new demands and solutions) and integrated with processes in the process. other organizations to deal with cross-cutting issues. Regarding optimization, [1] state that it meets the imperative of efficiency brought by management for results, which envisions doing more and better with fewer resources.

2.2 Brainstorming

This tool is defined as a process designed to create creative ideas / suggestions that will allow you to exceed the boundaries and paradigms of team members.

Brainstorming is conceptualized as brainstorming. It is a collective process where people launch ideas freely, without criticism and happening in the shortest possible time [2].

Another method of spreading ideas is through Brainwriting, also known as closed brainstorming, its only difference being that participants' opinions are provided in writing. Participants' ideas are not exposed, which reduces the risk of criticism and inhibition.

2.3 Ishikawa Diagram

The cause-and-effect diagram is part of a "problem" of all its influences, that effect and the identified causes are placed in the shape of a fishbone, which makes visualization, the relationship between all causes, and how the problem is much easier. This problem can be solved, a tool widely used in industry by quality management [3].

A detailed diagram begins to take the shape of a fishbone, so it is called a fish diagram. Cause and effect diagrams are designed to clearly illustrate the various causes or factors that affect a problem by splitting them into groups and relating them. the causes. According to [4], for each effect, there will probably be several major categories of causes. For example, the main causes of process variation are commonly known as 8M: Material, Machine, Labor, Method, Environment, Management, Raw Material and Measurement [3].

This diagram is used to jointly visualize the main and secondary causes of a problem, broaden the view of the possible causes of a problem, enrich its analysis and identify solutions, and serve to analyze processes for improvement [5].].

To establish the degree of importance of the causes, it should be based whenever possible on data and not only on people's experience to avoid the chances of misunderstandings. In order to facilitate data use, it is desirable that causes and effects be measurable [5].

2.4 5W2H

This method is focused on products and processes as strategic quality goals, where they are more directly linked to the company's business plan. Strategic goals are an addition to tactical goals and have a profound impact on the company's planning, which aims for top quality as a priority [6].

For this, the action plan 5W2H is indicated. It is a standard of organization of control and execution of tasks and campaigns where the responsibilities of each one are assigned: execution time, objectives and other information. According to [7], this 5W2H technique can be applied and adopted at any stage of the development of a study, moreover, this tool is not able to solve problems that need immediate situations.

High quality is achieved when product characteristics are best, when they meet customer needs and when shortcomings are lacking. The word quality has two main meanings: product characteristics that respond to customer needs and lack of deficiencies [6].

The purpose of this rule is to stimulate the generation of ideas from others already present. It is the

harnessing of the existing set of ideas to build new and better ideas. According to [7] the name 5W2H was given due to its structure, which is composed by the nomenclatures: what, who, where, when, why, how and how much.

2.5 Kaizen

Kaizen's activities involve TQC (Total Quality Control), which according to Japan's industry standards, to be executed, effectively requires the cooperation of everyone in the organization, including managers, supervisors and workers at all levels. the incorporated areas [8] and [9].

The Kaizen methodology applies some key time-based strategies that every manufacturer must consider in quality: how to improve it, cost: how to control it; timely delivery: how to guarantee it [10] and [11].

3. Methodology

The choice of the critical area originated from the survey carried out through the visit to the company, which was possible to observe the areas where there is a problematization of the organization, which identified the point to improve in its process of redistributing components in the assembly line. called the rear shock absorber.

According to the general objective, the proposed solution for the company, which is the implementation of quality tools, aiming at improvement in order to minimize the cost of materials used, reducing the time in the process, thereby improving production. and team development. The following quality tools were used: Brainstorm, Ishikawa, 5W2H and Kaizen; as a checklist to collect and analyze industrial process data.

Given the technical visit, there was a good reception by the line manager, who was provided with all the technical documentation, being very helpful in providing all the necessary information for the study, thus made clear the willingness to support the improvement within the line. company.

4. Study Application

The rear bumper assembly line process consists of 21 workstations and two QC (quality control), with total process line time in component assembly and including the QC workstations in 148.9 seconds. There is an oscillation in the times of each workstation, so a process mapping was made in the assembly stations to know which one was idle. However, two assembly stations were found with idle times, namely: workstation 6 and workstation 7.

4.1 Problem Identification.

With the use of quality tools the present study started to verify the times of each operator in the production line, the times were oscillating. Timing analyzes were even done with two QCs that control product quality, however, observed jobs far below the time stipulated by the company's work instruction.

In this way, it found the bad redistribution of components in process 6 and 7, so their times were between 3.6 seconds. It should be noted that the shortest suitable time to produce on the assembly line is 5 seconds, while the maximum time is set at 8 seconds, both within plus and minus tolerance.

Figure 01 shows the position of the operators on each workstation and their process times, illustrating the problem identification found on workstations 6 and 7. The assembly line works with 23 rear bumper mounting posts with full time 148.9 seconds of operation.

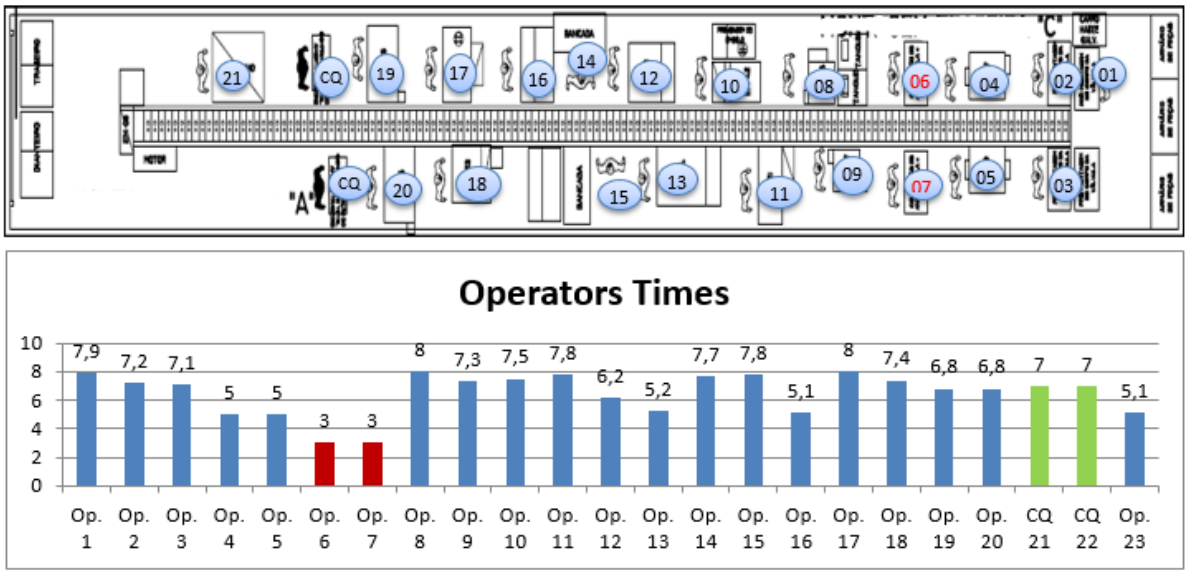

Figure 01: Production Line and Problem Encountered
Source: Own Author

According to figure 01, through the practices developed within the company, found that in the rear shock assembly line, there were two operators in the process, where the graph shows in red the OP. 6 and Op. 7 with idle times.

Thus, with the application of quality tools was made the analysis of changes where jobs 6 and 7 did not exist the need for operation and, failing to generate costs, providing greater profitability for the company.

4.2 Action Plan - 5W2H

According to table 01, the data shows the 5 whys for application in the rear shock mounting line assembly sector. With the manufacture of two benches to put ivories, the company invested about $ 900.00 reais. Therefore, with these stalls facilitates the storage of components, thus saving time in the process, considering that to be ready had a period of 30 days.

It is analyzed that by providing training for employees, everyone will know the process of distribution of appropriate components, thus avoiding the waste of time and cost as well. However, employees will find it easy to control materials accurately, always focusing on improving the operational process. As the training was carried out at the company and as internal speakers, the training costs do not occur, they are free of charge.

Table 01: 5W2H for Company

Item	Activities	Why	Who	When	Where	How Much
1	Manufacture of two ivory countertops.	Need for workbenches	Workstation	30 days	Company Maintenance Sector	R$ 900,00
2	Review of operational procedures for staff training.	Material handling	24 employees	15 days	Company Training Room	Free of charge
3	Review a process time goal for the team.	Process time	24 employees	10 days	Company Training Room	Free of charge
4	Training and awareness with all employees	Raise awareness of employees	24 employees	20 days	Company Training Room	Free of charge

Source: 2018 Company Adaptation

5. Results and Discussions

Suggestions for improvement actions for the redistribution process: A mapping of the process line under study was created; A standard operating procedure for component redistribution has been developed; Checked visibility on the issue of time; The team was motivated to get involved and have a commitment to the process, saving time in the operationalization, because healthy and happy people are more productive; The team was trained because it lacked guidance in the process to be developed; Purchases of new equipment were reduced.

5.1 Assembly Line Results

With the use of quality tools, the process optimization takes place in the rear shock absorber assembly line workstations, in this way the components are redistributed in the assembly line. The optimized process, it is necessary that the jobs 6 and 7 stop working, because they were with idle times and the work process to be inserted in the jobs 4 and 5 without exceeding the maximum time of each operator that is estimated by the company standard at 8 seconds. By optimizing the rear bumper assembly process line, it works with only 21 workstations, with a total process time of 148.9 seconds.

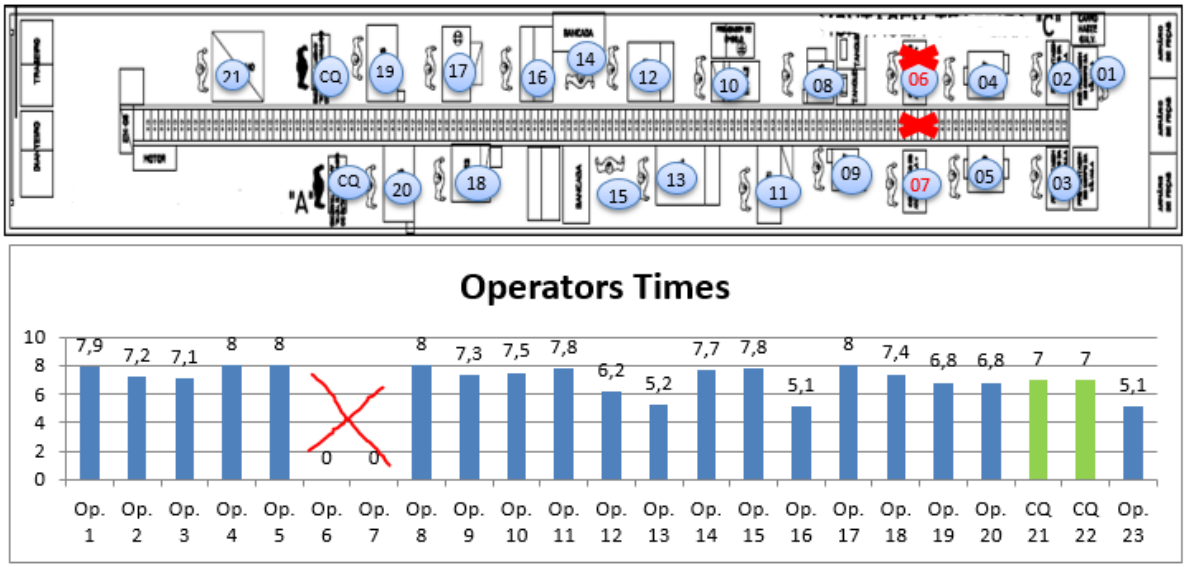

Figure 02: Process optimization

Source: Own Author

5.2. Costs Obtained

In the rear shock absorber assembly line, 23 employees are employed for its proper functioning. As shown in table 02, the average salary of each person costs R $ 1,200.00 reais. A total of R $ 27,600.00 per month for all employees of the assembly line. With the new proposal for improvement in process line optimization, it will be necessary to reduce the number to 21 employees, totaling the cost of the production line by R $ 25,200 reais per month. Therefore, it will have a cost reduction of R $ 2,400.00 in the month, and this cost reduction is very significant for the company.

Table 02: Demonstration of Costs.

Cost value statement before survey		
Total Operators = 23	Total cost = R$ 27.600,00	Assembly line costs before applying the rear bumper assembly process improvement.
Cost value statement after survey		
Total Operators = 21	Total cost = R$ 25.000,00	After the process optimization, it obtained a reduction of two jobs, with a reduction of costs.
Profitability for the company		
Profit	Total per month	R$ 2.400,00

Source: Own Author

6. Final Considerations

According to this research, it was observed that the company in which the article is about, is able to receive the tools shown in this paper, and the main focus is the form of redistribution of components, wasting time in the process. and with that, it was generating cost.

Given the above, the tools proposed in this article are intended to ensure improvements within the

company's so-called rear shock line. However, this improvement implementation work has provided a considerable improvement in performance standards regarding redistribution time issues.

This study will show the organization new ways to improve operational processes, establishing current levels of responsibility and reducing the consumption of raw materials and energy, with fundamental consequences for the company's cost. However, it has been taking measures that characterize it as a proactive company and that will serve as benchmarking for other companies.

By proposing to develop a standard operating procedure for component redistribution, the company has shown that it has achieved the expected goal. The proposal is to reduce the number of employees with the new redistribution procedures, and thereby reducing employee costs, two employees were removed from the line.

With this in-house planning, it ensures that you serve the industry with a secure flow of materials and services to meet your needs, and no expense due to poor operation with shock absorber components.

The company project achieved its expected results, however, it was to reduce the expenses and costs of some existing problems in the company, and these shortcomings were simply dealt with minor in the assembly line. The proposal was presented to the company as a demand for optimization in the work process in the so-called assembly line. Therefore, the company was in charge of analyzing the proposed case study and applying it in the future to its work process. In view of the cost reduction obtained per month with the proposed improvement.

7. Acknowledgment

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