Maintenance Cost Reduction in Facilities and Utilities Areas

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Abstract

Maintenance and repair spending is a normal and expected cost of facility ownership. However, the cost can be minimized through an aggressive facility management program and the use of applicable diagnostic tools. Costs of parts consumption and preventive maintenance activities were evaluated for Mylan LLC, Caguas Site. These costs were accounted for $59,700 in utilities, facilities and environmental areas. The voice of customer requested reduce costs of spare parts consumption in the preventive maintenance activities, preventive maintenance (PM) frequency rationalization and eliminate non-value added (NVA) tasks in preventive maintenance activities. DMAIC approach methodology was used to reduce the maintenance costs. Fishbone and others Root Cause Problems Tools were used to determine what the possible cause of the highest costs of parts consumption, redundant frequency of preventive maintenance activities and tasks with no value added. Method, equipment and materials were the most probable causes. Improvements in the procedures and forms used to perform the preventive maintenance as well as the rationalization in the frequency of the tasks using the ANSI/ASHRAE/ACCA Standard 180-2012 "Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems" as a guideline for frequency assignment were actions implemented to reduce the maintenance costs [1].

Introduction

Preventive maintenance (PM) is applied to most mechanical equipment, utilities, facilities or environmental areas in pharmaceutical or biotechnological industries [2]. It is important to identify the potential failure in equipment, utilities, facilities or environmental areas and define the intervention time for preventive action to take place before the functional failure happens. There is a necessity of the companies to keep the balance between their operations and the dedication of resources for maintenance. It makes the constant evaluation of the programs and executions.

Mylan, Caguas on 2017 evaluated the costs associated to maintenance of utilities, facilities and environmental areas as well the preventive maintenance program. It was determined that these costs are excessive and the process to complete the PM activities is long, repetitive and no rationalization in the PM frequency was considered. Therefore, non-value-added tasks are included to the PM activities.

Background

This project arises from the need to improve the processes of Mylan LLC, Caguas and promote a culture of continuous improvement.
Mylan, Caguas identified the Maintenance Costs as one of the top offenders in engineering processes on Year 2017.
For this project, the customer focused in reduce costs of spare parts consumption in the PM activities, in rationalize the PM frequency and eliminate non-value added (NVA) tasks in PM activities using Lean Manufacturing methodology.
LEAN was applied to the High Maintenance Costs in a determined period using DMAIC methodology that was developed to improve the process and to effort the customer needs.

In the current process, the costs are excessive and the process to complete the PM activities is long, repetitive and no rationalization in the PM frequency was considered. Therefore, non-value-added tasks are included to the PM activities.

The goal of this project was:

- ❖Obtain a maintenance cost reduction between 15% to 20%

The Voice of Customer (client) required:

- ❖Reduce Costs of Spare Parts Consumption in PM Activities
- ❖PM Frequency Rationalization
- ❖Eliminate Non Value Added Tasks in PM's

Problem

- ✓ Costs on parts' consumption for PM activities during 2017 accounted for $59,700 for the following areas:
  - ✓Utilities
  - ✓Facilities
  - ✓Environmental
- ✓The cost associated to PM tasks associated to external contractors was $62,963.

✓In addition, it was observed that different frequencies and tasks were assigned of utility, facility or tasks related to environmental area.

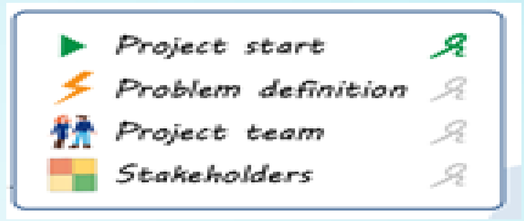
Methodology

This project will apply the DMAIC (Define, Measure, Analyze, Improve, Control) methodology to improve the maintenance cost, rationalization and eliminate the non-value tasks in Preventive Maintenance activities. The five phases that structure the process in which is based this project are:

Results and Discussion

This project arises from the need to improve the processes of Mylan LLC, Caguas and promote a culture of continuous improvement.

Define Phase



High PM costs in the utilities, facilities and environmental areas were identified as a potential problem to be reduced using Lean Methodology and DMAIC approach. A multidisciplinary team was selected to work with this project.

The problem statement was defined as High Costs on parts' consumption for PM activities during 2017 for the utilities, facilities and environmental areas. The customers (engineering supervisors and managers that are on charge of the PM program) and their requirements were identified.
. Project measures, financials and a communication plan are established [4].

Measure Phase

In this stage, the data gathering was obtained from SAP reports. Data was plotted to established a baseline performance and quantify the problem. The data can be showed in graphical and statistical forms. The data and information of the current process is portrait in the figures 2-7.

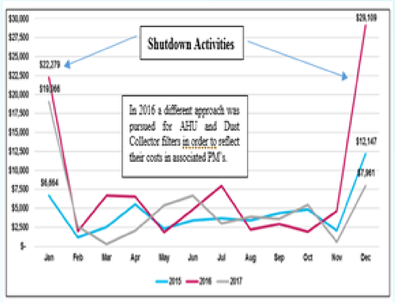


Figure 2: **Monthly Cost Comparison on Parts Consumptions for PM's**

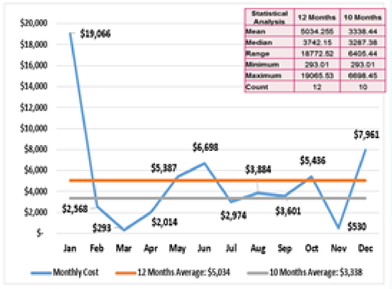


Figure 3: **2017 Monthly Cost on Parts Consumptions for PM's**

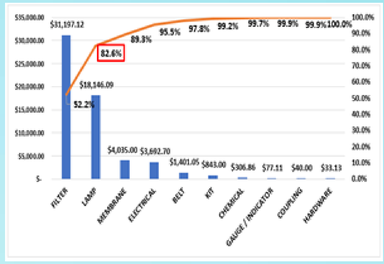


Figure 4: **2017 Costs and Distribution by Part Distribution by Part Group in PM's**

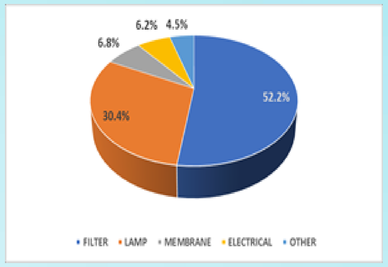


Figure 5: **2017 Pie Chart of Distribution by Part Group in PM's**

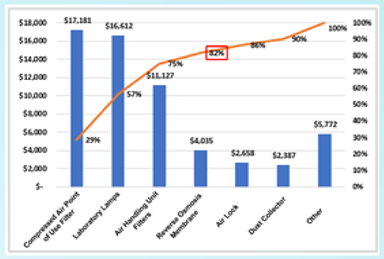


Figure 6,: **2017 Costs and Distribution by Equipment / System Group in PM's**

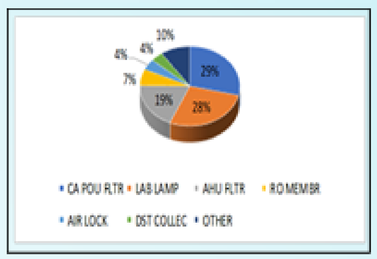


Figure 7: **2017 Pie Chart Distribution by Equipment / System Group in PM's**

Analyze Phase: In this phase the cause (s) of the problem are identified. Fishbone diagram was used to analyze the root causes. The top offenders of the current process that are identified as equipment, method and materials are represented in Figure 8, "Fishbone Diagram".

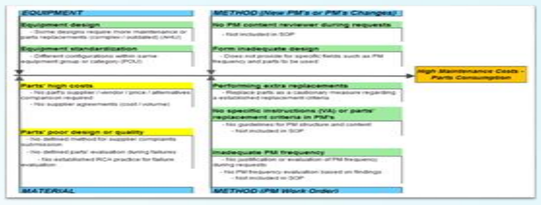


Figure 8: **Fishbone Diagram**

Improvement Phase: For this stage, Project Management Fundamentals & Kaizen DMAIC tools were used to develop and deploy an implementation plan. The following actions and their benefits were part of the implementation plan. These actions and benefits included:

- 38% of Preventive Maintenances tasks (20 of 53 tasks) were modified to reduce PM frequencies.
- Yearly PM work orders reduction of approximately 430 PM's (40% reduction vs 2017) by PM frequency changes, PM consolidation and PM elimination.
- Cost reduction from NVA PM's executed through Contractors Services:
  - Approximately $34,000 per year (54% of evaluated 2017 services)
  - Backup compressors Monthly and Bi-annual PM's eliminated and modify quarterly PM to be reassigned for in-house execution.
- Elimination of other NVA PM activities.
- A form of procedure PR-SOP-ENG-GEN-0001" Preventive Maintenance Program" was revised and placed effective.
- The selected PM task lists was updated with new frequencies, the NVA activities eliminated. Indicators of unacceptable condition as replacement criteria was included in the procedure.

Control Phase: The main purpose of this phase is to control the improvements identified, and thus, keep the process on the new desired path. Some tasks or documents that will be periodically monitored are:

- PM Request Form
- Procedure PR-SOP-ENG-GEN-0001 "Preventive Maintenance Program"
- Personnel Training
- SAP Reports: Finance / PM
- Inventory Control in Stock Room Area

Conclusions

Using DMAIC approach it was possible to reduce costs of parts consumption and preventive maintenance activities at Mylan Activities, Caguas Site. After collecting and classifying the data, Lean Manufacturing tools were used to determine what are the possible cause of the highest costs of parts consumption, redundant frequency of preventive maintenance activities, and tasks with no value added. I Improvements in the procedures, and forms used to perform the preventive maintenance as well as the rationalization in the frequency of the tasks using the ANSI/ASHRAE/ACCA Standard 180-2012 "Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems" as a guideline for frequency assignment were actions implemented to reduce the maintenance costs [1]. A 38% of PM tasks (20 of 53) were modified to reduce their PM frequencies. A total parts savings of approximately $10,200 per year (17% of parts cost reduction vs 2017) were reached. In addition, yearly PM work orders reduction of approximately 430 PM's (40% reduction vs 2017) by PM frequency changes, PM consolidation, and PM elimination. This represents approximately 320 hours released annually for the mechanics to perform other tasks. Cost reduction from NVA PM's executed through Contractors Services added to approximately $34,000 per year (54% of evaluated 2017 services). Even though the improvements were successful, and the expectations and goals complied, there are lessons learned, and additional opportunities to improve the Preventive Maintenance program that will be reached in the next stage of this project.

Future Work

Additional opportunities to improve the Preventive Maintenance program are:

- ❖Extend PM program improvements for Operations (MFG & PKG)
- ❖Evaluate implementation of supplier agreements / complaints management
- ❖Complete study for Gold Lamp (UV filtered) lights elimination in Laboratory
- ❖Evaluate installation of compressed air filter indicators in POU's to implement replacement criteria

References

REFERENCES

[1] ANSI/ASHRAE/ACCA Standard 180- 2012 Guideline "*Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems*"

[2] Borror, Connie M. (2009). ASQ Quality Press: The Certified Quality Engineer Handbook, Third Edition, ed., 2009, pp. 321–332).

[3] Food and Drugs Administration 21 CFR Parts 210 & 211 (2018). *Current Good Manufacturing Practice in Manufacturing, Processing, Packaging, or Holding of Drugs and Finished Pharmaceuticals*

[4] JR Excellence Solutions (2018). *Focused & Accelerated Solution Tactics Improvement Program.* Project Management Fundamentals & Kaizen DMAIC Training