Reliability Excellence in Utilities

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Abstract

Abstract - The Reliability Excellence tools and methods are explained through this paper providing an effective understanding on how to apply it in different areas such as: utilities, facilities and manufacturing. Using the Reliability Centered Maintenance as methodology and the Asset Criticality Ranking as foundation, it was identified the top critical assets within the Utilities area. The identification of critical assets is performed between different departments at the same location to get all inputs simultaneously. Based on the Asset Criticality Ranking, the approach to implement the Reliability Excellence is What if Exercises. From the 36 What exercises performed, 28 were approved and 8 were not approved since there was product impact regarding safeguards suggested. Based on the What if Exercises, 19 Preventive Maintenance Job Plans must be revised to have strong tasks in order to increase Utilities equipment performance. In addition, it's required 2 equipment modifications to replace obsolete parts by new ones minimizing the risk of failure by 67%.

Key Terms – Asset Criticality Ranking (ACR), Computerized Maintenance Management System (CMMS), Failure Mode Effects Analysis (FMEA), Predictive Maintenance (PDM), Preventive Maintenance (PM), Root Cause Analysis (RCA), Reliability Centered Maintenance (RCM), Reliability Excellence (Rx), Real-Time Monitoring (RTM), Run-to-Failure (RTF).

Introduction

During the latest 30 years the pharmaceutical industry has used different tools or concepts to improve current processes looking for better results with ambitious goals and objectives. In that journey, maintenance topics are prohibited for many companies or this work is considered an expense instead of an investment for manufacturing.

Project Description

The company Z located at east of Puerto Rico is a pharmaceutical industry with vast experience manufacturing oral solid dosage products. As part of new product transfer to the site, there are several challenges on how to improve the reliability for utilities equipment. Most of these products require utilities supplies more stable and reliable for working in specific ranges to avoid discard the product if there is a deviation regarding environmental condition parameters or compressed air pressure.

Objectives

The objectives of this project are to prevent major breakdowns and to reduce downtime in the utilities operations. Currently, there is 1 major breakdown/biweekly and equipment downtime

Project Overview

A risk based in Reliability Centered Maintenance initiative is adopted to ensure potential risks are identified and safeguards implemented. Safeguards are those precautions that improve the process and replace the reactive mode into a proactive behavior. Through the RCM tool, the inherent risk in the critical utilities equipment operations and maintenance is analyzed to make sure adequacy/robustness of existing safeguards which can be improved taken in consideration equipment performance trends. Also, examine the maintenance basic conditions, operating standards, deterioration, design weakness and human error practices and effectiveness to prevent:

- Breakdowns
- Downtime
- Setup or adjustment failures
- Start-up or shutdown losses

Data Analysis

It was performed an assets evaluation based on the ACR. About 65 Utilities assets were assessed using the ACR tool. To determine the Asset Criticality Ranking score were used the following criteria's:

- Equipment Availability – How many hours is it required to operate?
- Cost of Operation – What is the effect in the cost of operation?
- Quality – What is the effect on product/output quality?
- Environmental and Safety – How will the safety of the people be affected?
- Operational Failure History – How frequent does a failure occur?

  Mode of Operation – How ill operational throughput be effected (run time, efficiency, etc.)?

The scoring of each asset was determined between all site departments to avoid surprises at the end of the ranking list. As part of the assessments completed in the ACR analysis, it was distributed the downtime by top offenders based on the Utility service (Figure 1). The information gathered in the process shows the HVAC utility as the top offender with 49% downtime in a full year.

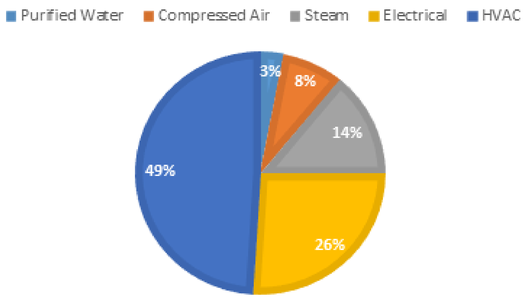

Figure 1
Downtime Distribution

Results

The recommendations and safeguards from the 36 What if Exercises (Figure 2), 28 were approved by all representatives and 8 were not approved since there was product impact regarding safeguards suggested. However, for those 8 What if Exercises not approved it was identified other options to mitigate equipment downtime or major breakdowns.

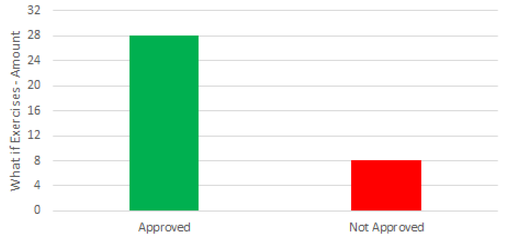

Figure 2
What if Exercises –Tracking Tool

In the What if Exercises were identified 19 Preventive Maintenance Job Plans that must be revised to have strong tasks in order to increase Utilities equipment performance. In addition, it is required 2 equipment modifications to replace obsolete parts by new ones minimizing the risk of failure by 67%.

Conclusion

After finalizing the implementation stage of the safeguards and recommendations, it is evidenced through the What if Exercises and RCM tool the equipment downtime and major breakdown will be reduced in alignment to the project objectives. Based on the actions identified, there is no expectation in having major breakdown biweekly and equipment downtime reduction by 30% in order to support product transfer keeping Utilities operations reliable and in control. The implications in the project will be the sustainability of the actions implemented. Taking in consideration that point, it will be created a periodic review of the data gathered to evaluate the effectiveness of the safeguards.