An Asset Tracking System for Manufacturing Laboratory Applications

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Abstract

Globalization and technological advances had made industries to implement systems in which the outcome could be reflected in their competitiveness. Most of the industries incorporates laboratories within their structure to serve as research, developers, design, non-compliance testing and analysis; along with all the work required to perform successful testing and analysis, comes the proper use, maintenance, and record of laboratory equipment or assets. This research intents to improve laboratory efficiency by reducing and eliminating problems/situations caused by the improper record of laboratory assets and lack of team communication. This was achieved using a software called "ProofHub". ProofHub is a useful management tool that provides powerful features offered under one platform. A statistical analysis was performed using Minitab Software to prove that the testing cycle time was reduced with the system implementation; additional outcomes were also achieved such as improved communication, effectiveness, and productivity.

Introduction

In the manufacturing industry, it is important to measure components precisely to ensure product/service quality [1]. Most of the time, laboratories consist in a significant quantity of equipment which requires constant attention of functionality and performance. An additional task to all laboratory personnel is to keep up equipment information and to share it with all the team members. The intent of this investigation is to develop a tool that helps keep track of lab equipment assets; and relate it to how does a tracking stage reduces equipment problems, testing delays and malfunction prior to maintenance stage. This investigation proposes to reduce and eliminate the problems and/or situations that arise with the lack of team communication and traceability of laboratory equipment. When time, productivity, conformance, and earnings are at stake, assessments and action plans must be prepared and planted like the intention of this proposal.

Background

Any industry will benefit from implementing a laboratory asset tracking system which could be tracked and monitored by each team member of the specific organization. From researcher experience, have witnessed how and why the situations presented in the problem statement occurred; all is due to deficiencies in equipment monitoring and in team communication.

Background Con't

The researcher proposes the implementation of a tool that would help into monitoring and communicating laboratory equipment information from and to team members. In a globalized world, where communication and technology are interconnected, it is important to use resources considering use complexity and most importantly the alignment with the desirable outcomes. Selecting a proper tool for the laboratory asset tracking system required various research so the objectives of this proposal could be met. The expected outcomes of the proposal are determined by the objectives proposed and how they were met by implementing a laboratory equipment system.

Problem

The overall goal of these research was to reduce and eliminate problems that arise for lacking on an equipment monitoring system between team members of an organization. With "The Implementation of an Asset Tracking System for Manufacturing Laboratory Applications" researcher expect to improve laboratory equipment monitoring to promote efficiency. At the same time, enhancing team communication related to equipment tracking and monitoring. The solutions of problems with the implementation are:

- Testing cycle time reduction – Promoted communication and knowledge between laboratory team members and reduce delayed testing.
- Equipment Failure Reduction – Achieved due to on-time calibration and equipment maintenance.
- Test Failure Reduction – Improved team communication, failure could be avoided with known maintenance dates, requirements and years of asset left.

Methodology

The design and implementation of the equipment tracking system is the basis to accomplish the established project objectives. These will be categorized into three project stages following the flow chart presented in Figure 1. The stages represent the structure and design of the equipment tracking system and how it would be implemented (Refer to Table 1).

Figure 1
Methodology Flow Chart.

Team Member	Asset Designation
Team Member 1	• Microscope - 200 Lens - 220 Lens - Z100 Lens
Team Member 2	• Analytical Balance - Weight Set 1 - Weight Set 2
Team Member 3	• Mechanical Properties Tester - Weight Set - Load Cells

Table 1
Asset Distribution Example.

Results and Discussion

After completing each stage presented the methodology section, the reduction of equipment problems, testing delays and malfunction prior to maintenance were reduced and/or eliminated. These was achieved by implementing the Equipment Tracking System, specifically for laboratories in the manufacturing industries, in which an organize, remote, and communicative platform was used. The platform was used to share information about assets within all team members, to visualize, track and create awareness of equipment malfunction, calibration, and maintenance and most important to improve peer communication to commit the reduction of testing delays due to situations with the equipment. The management application selected was "ProofHub" which allowed multiple activities needed to perform a functional and reliable system. Along with the presented results, statistical analysis was performed to determine if testing cycle time could be reduced due to the system implementation (Refer to Figure 2). It was successfully proved that the objectives of the project were accomplished. With the Hypothesis Test results, it was concluded that for t-test, with a resulting p-value of p=0.001; since the p-value resulted lower than the alpha level of 0.05, the null hypothesis is rejected. The alternate hypothesis is accepted, which establishes that the testing cycle time is less than 20 hours per day with 95% confidence level (Refer to Figure 3). It is important to understand that the less testing cycle time, the more quickly a team can complete the test for one item.

Figure 2.
Asset Management System Active Platform View.

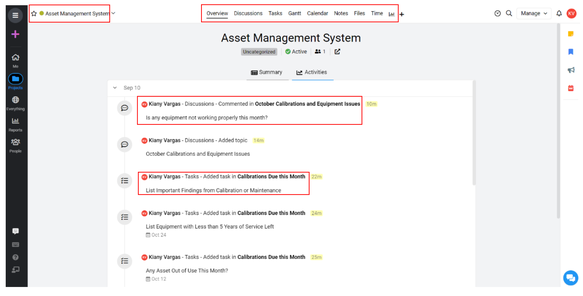

Figure 3.
Statistical Analysis Results using Minitab Software.

Descriptive Statistics

N	Mean	StDev	SE Mean	95% Lower Bound for μ
12	25.417	0.793	0.229	25.006

μ: population mean of Tests Performed

Test

Null hypothesis H_0: μ = 25
Alternative hypothesis H_1: μ > 25

T-Value	P-Value
1.82	0.048

Conclusions

Industrial research has grown throughout the years, and the importance of it relays from selecting the best materials to determine and discover all the hidden factors that determine material behaviors [2]. Manufacturing industries would be impacted and benefit with an implementation of the Equipment Tracking System. Research results has provided a more complete understanding on how the effect of the tracking system will reduce cycle-time, improve communication, and promote continuous improvement.

Conclusions Con't

Within the contributions provided by the research and project are the following:

- Reduce the cycle time of testing per month.
- Create awareness of equipment functionality, maintenance, and changes.
- Promote a culture focused on teamwork.
- Facilitate calibration information to use action plan when equipment cannot be in use.
- Reduce testing failure.
- Create accountability for team members (lab technicians).
- Track the years of service left for each asset.
- Enhance commitment in the workplace.

Future Work

For future research, an upgrade version could be obtained with more research and data for an even better outcome. Additionally, inter-lab and/or intra-lab comparisons could be useful to collect comparative data in which the impact of having or not an Equipment Tracking System could be observed and analyzed. The comparison will lead to improvement areas and to more laboratories adapting this powerful tool. Each organization has their own needs and could adapt the systems performing some modifications that would be useful for the type of industry and work done in each laboratory scenario.

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References

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