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Maintenance KPI's, How to Start?

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Introduction

Most of maintenance engineers, focus reliability on practices to enhance assets performance and pursue implementation of new technologies to achieve “world class maintenance operations”. CBM, RCM, FMEA, MTBF, MTTR, LLC are common acronyms for this “one of kind” professionals aiming for maintenance excellence. However, it is very common to see a considerable amount of efforts in aligning resources to enhance maintenance programs, however, engineering practitioners forget about another acronym, KPI's (Key Performance Indicators).

This document pursues the discussion of considerations to have defining KPI's; and typical metrics as a reference for your business to support KPI's definition of your maintenance program.

Problem Statement

The main problem associated to lack of KPI's is, lack of results obtained from any effort to improve equipment reliability. Continuous improvement initiatives need to obtain results to continue receiving support from top management. Not having readily available feedback, will create doubts on the progress and effectiveness of your reliability program. Such feedback is required in a timely fashion to increase sponsors and customers' interest and support. Here is where KPI's have a significant role.

KPI's should provide the status of your reliability program with the conversion of your data warehouse to relevant information. The ability to create this conversion, will keep your organization well informed, that's the

main goal of your metrics. Again lack of this communication tool is the main reason to undermine your own reliability efforts.

Be SMART! (or MPROS?)

It is necessary to review a concept to assure the effectiveness of a metric. Probably, most of you know the SMART concept associated to goals setting. A goal should be:

- **Specific**
- **Measurable**
- **Attainable**
- **Realistic**
- **Time Phased**

Following the same approach, KPI's should comply with some basics concepts as follows:

- **Meaningful**
- **Proactive**
- **Readily Available**
- **Oriented to Department Goals**
- **Specific**

MPROS will be the vehicle to follow on the implementation of KPI's. Let's analyze each concept using examples to have a clearer idea on how your KPI's should comply.

Meaningful

Make sure that your KPI measure a meaningful area of your business. Sometimes metrics are aligned to represent very accurate information of meaningless area, i.e hours of

corrective maintenance activities. Does it make sense to measure hours of corrective maintenance activities or just measure the corrective maintenance events? If KPI's are pursuing migration from reactive maintenance to non reactive, analyzing corrective maintenance hours will give you an indication of results obtained by maintenance management as a result of actual practices. There is no much impact measuring this area because it is measuring past history without any proactivity. This kind of KPI is known as a lagging KPI.

To lead management efforts, it is required to measure data that may impact the way you manage your business. So a leading metric is required. An example of such metric could be hours of predictive maintenance (PdM) hours and better than PdM hours, could be hours of corrective maintenance as a result of PdM work orders.

Just think about it!

Proactive

There is a tendency to set KPI's based on existing data because it is an "easy task". Is typical to see KPI's trying to measure reliability of a maintenance program with a corrective vs. PM work order ratio. This ratio could represent a good metric, however, the indicator just give a status of your maintenance program, but no specific direction where to go. It just tell you that X% of your work orders are corrective vs. a Y% goal.

A more proactive way using the similar data could be, how many corrective work orders could be avoided, because PM (or CBM, if applicable) tasks was in place. This metric is more related to the effectiveness of your

maintenance program. Leading initiative actions are required to improve this metric towards the evaluation of corrective maintenance activities by simple techniques like:

1. Root Cause Analysis
2. PARETO
3. 5 Why's

Such actions definitively drive a proactive improvement on your maintenance tasks.

Another proactive metric could be, how many PM hours has been eliminated as a result of predictive maintenance activities.

Remember, your KPI's should drive results!

Readily Available

This is the backbone of your KPI's. Typically, an RCM engineer invests 3 or 4 days by month closing to put together a report on KPI's for top management. Then maintenance department members have no access to the report until the departmental monthly meeting takes place. Does this scenario sound familiar?

Although communication to top management is very important as stated previously, the key players of any initiative are maintenance technicians, operators, first line supervisors, and customers. These groups should be on top of KPI's to maintain such players observing the results of their effort. Timely feedback is the best foundation to keep any initiative. Once all KPI's are defined, a mechanism to automate KPI's preparation is a must. Support from Information

technology group should be integrated to achieve this. Keep in mind to include the infrastructure to do all the calculations and to make the KPI's results readily available to the whole team in a "click based" approach.

Oriented to Department Goals

These KPI's should be included into the set of departmental goals to assure two important benefits:

1. Support from department top management.
2. Obtain full adherence from executioners of tasks on a day to day basis.

A "collateral benefit" of this approach will be a "natural effort" to obtain results.

Specific

Specificity is a critical aspect of KPI's. Broad metrics, overload maintenance key players with a data warehouse to be converted in information, resulting into "mechanical" metrics, handled by a computer measuring a universe of assets.

It is required a pilot program to learn how to implement the metrics with effective effort, with higher probability of success to obtain expected results on assets performance, rather than a bulletin board full of "beautiful pictorial" metrics showing results, but leading to nothing.

Being specific under a pilot program will provide an "easier to handle" set of data to learn how to implement KPI's. Then, the team could to expand the span of the metrics as they feel comfortable with obtained results.

Remember to start focusing on a critical assets pilot, to learn and expand span of control.

KPI's Examples

TABLE 1, shows a list of common KPI's as a reference and starting point to conduct a brainstorming session of any effort conducted to improve your KPI's. Some are basic, but necessary, as overtime control. Others are specific, sophisticated, but lead to obtain results.

Summary

There are additional considerations to follow when implementing KPI's. The main purpose of this article is to provide a guide on how to select areas and what to pursue with each KPI. The main idea is to define a balanced set of proactive, meaningful KPI's aligned to department goals and readily available to stockholders of any business members impacted by Maintenance Business Unit.

**Table 1
KPI's**

Failures

Mean Time Between Failure
 MeanTime To Repair
 Failure Frequency / Failure Rate
 Number of RCAs, Weibull analysis, PARETO analysis

Scheduling

Scheduled vs unscheduled maintenance hours

 Scheduled WOs complete within planned estimate

Operational

Percentage of man hours/Work Orders of PdM activities from total hours/Work Orders.
 Percentage of man hours/Work Orders of corrective WOs due to detection from PdM activities. (Vibration analysis, Infrared / Ultrasound surveys, Tribology)
 % Overtime hours.

Training

Skills matrix completion %
 Personnel training hours

Costs

Maintenance cost per unit output (#steam, ft³ compressed air, etc.)
 Craft utilization (hrs. reported vs. actual hrs.)

Program Performance

Number of assets with reliability trending up

 Numbers/hours of over maintenance activities reduced from budget