

**7 steps to
become a**



KPI Ninja

**A Guide to measuring
Maintenance, Planning and
Scheduling performance**



Key Performance Indicators are an important tool for monitoring work management in a maintenance department. These metrics enable maintenance management to measure, analyze, evaluate and improve on key factors which influence the success of the maintenance department. And KPI's are a vital tool in determining when interventions are required to correct a part of the maintenance process.

7 steps to becoming a KPI Ninja

Here are 7 steps which will work for virtually any maintenance department in effectively any sized company.

1. **Define** which KPI's you wish to measure from the list below, and where the data will come from.
2. **Extract** the data, preferably straight from the CMMS.
3. **Degree of Complexity** to be evaluated. Decide on spreadsheet or online dashboard.
4. **Build** the KPI's.
5. **Automate** the KPI's as much as possible.
6. **Analyse** the results.
7. **Communicate** the measures across the department.

Define

You need to decide which KPI's to measure. Data should be readily available from your CMMS, or some other data source. In defining KPI's to measure, you must consider whether the data is readily available.

Take it one step further, and define which CMMS fields will be input to each KPI formula. This is different for each site, because different sites tend to implement their CMMS in vastly different ways.

Extract

Figure out a system to extract the KPI data. This should be as simple as setting up some standard reports in your CMMS. The same set of data will be extracted each week using the same method. Ideally this is done by automatic batch jobs to generate a report from the CMMS. Alternatively, it could be a manually extracted report generated at the same time each week.

The standard way to measure maintenance KPI's are to measure use weekly intervals. That is, to collect an entire week work of data as one sample. And the most effective data uses 2 snapshots: a forward snapshot and a backwards snapshot.

Forward Snapshot

The forward snapshot is taken prior to commencement of the scheduling week. It captures the scheduled work for the upcoming week. If the Scheduling week is from Monday to Sunday, the best time to take the forward snapshot is on Sunday night.

Backward Snapshot

The backward snapshot is taken after the completion of the scheduled week. It captures the actual work for the past week. If the Scheduling week is from Monday to Sunday, the best time to take the forward snapshot is Monday Morning.



Degree of Complexity

The degree of complexity of Maintenance KPI's range from simple spreadsheets developed by a Maintenance Planner, to complex Business Intelligence or Knowledge Manager structure, typically run by an IT department. They may be fully automated into a company intranet or dashboard. Complexity generally depends on the size of the company and maintenance budget.

The below KPI's are simple enough that they can typically be set up on a spreadsheet and run each week from within the Maintenance Planning department. They should ideally take less than 1 hour per week to run and distribute. Anybody with an intermediate knowledge of Excel should be able to set these up. Some basic formula skills will be required, such as VLOOKUP, HLOOKUP, COUNTIFS, and SUMIFS.

Build

As stated, simple spreadsheet driven KPI's can be built by anybody with intermediate Excel abilities. Complex KPI's will most likely need to be built by computer programmers, and possibly even an implementation team.

There should be set of KPI's including ALL maintenance, and also separate KPI's for each of the major work teams or contractors. It's important to keep consistency; all work teams are calculated exactly the same way.

Automate

The best way to manage the snapshots is to set up batch jobs within the CMMS. Each snapshot is automatically taken at the same time each week. But if this is not possible then the snapshots can be taken manually.

The rule of thumb is that KPI's should take no longer than 1 hour to produce each week. Any more than that and the degree of automation should be increased.

Analyse

A weekly review of the KPI's is necessary to help make necessary decisions to control or improve the maintenance process. It is through analyzing the KPI's that appropriate interventions can be triggered, after recognizing an issue. Proper identification can lead to better maintenance and improved asset reliability.

It is important to set the KPI's up so that the data is transparent enough to permit analysis. Thoughtful analysis can usually pinpoint some part of the maintenance process which has resulted in poor KPI results. Some clues are given in the Key Performance Indicator Library section below.

Communicate

It is important that work teams are given access to view their Key Performance Indicators each week. This can be in the form of an email, or posted on an intranet website. Old fashioned noticeboards are also an effective way to communicate results, because the work force is then able to see their own results.

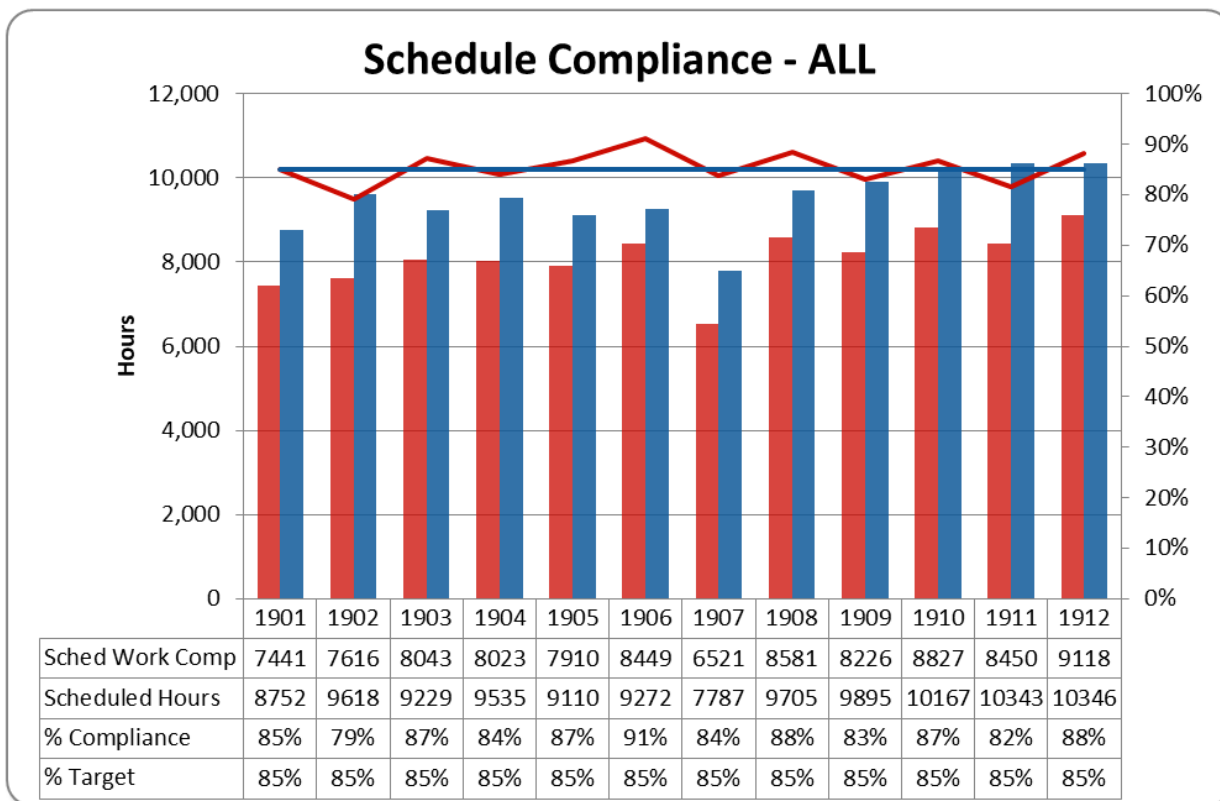
It is important that KPI communications are not too technical. Not everybody understands complex KPI's, so it's important to make them as user friendly as possible. It is a good idea to select just a few of the most important KPI's for public display.

Communication KPI's is a wonderful tool for motivating work teams, especially when their results are pleasing. This is a form of positive reinforcement, to encourage the workers to feel good about doing a good job.

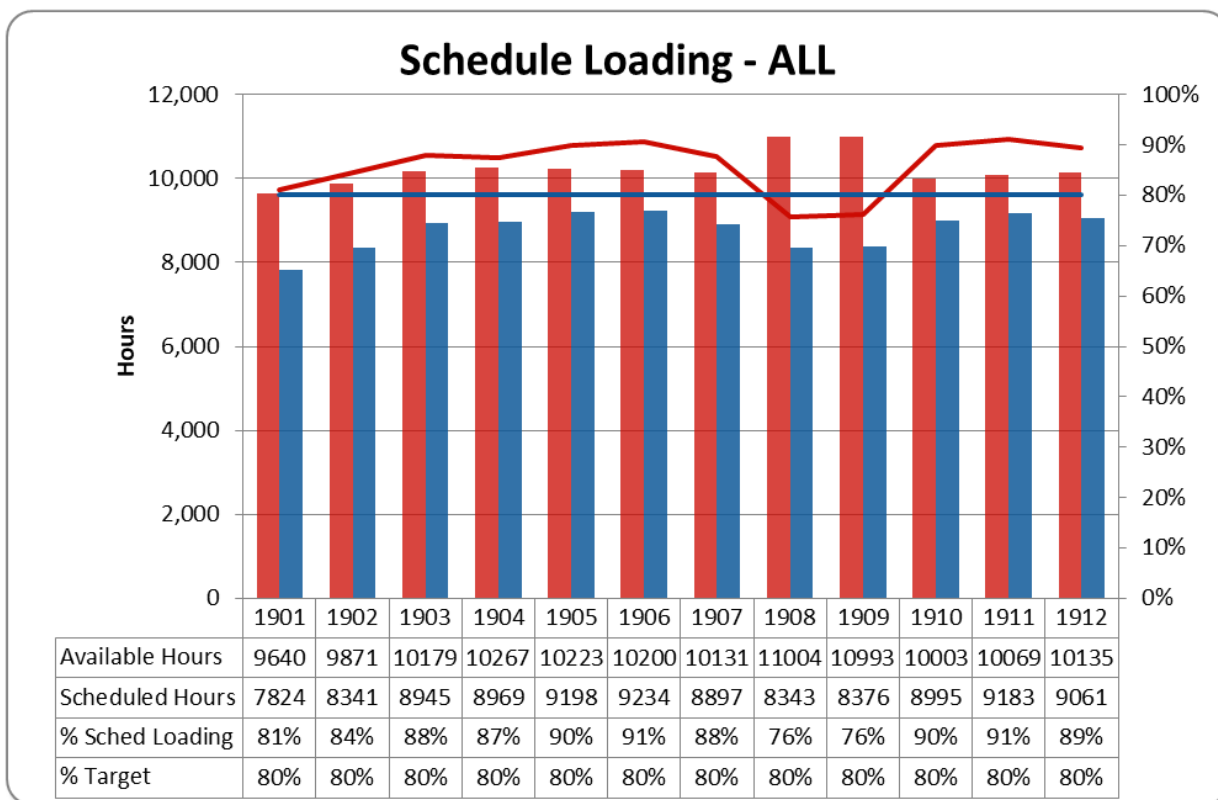
Key Performance Indicator Library

Here is a standard suite of KPI's which you can use to measure overall maintenance performance.

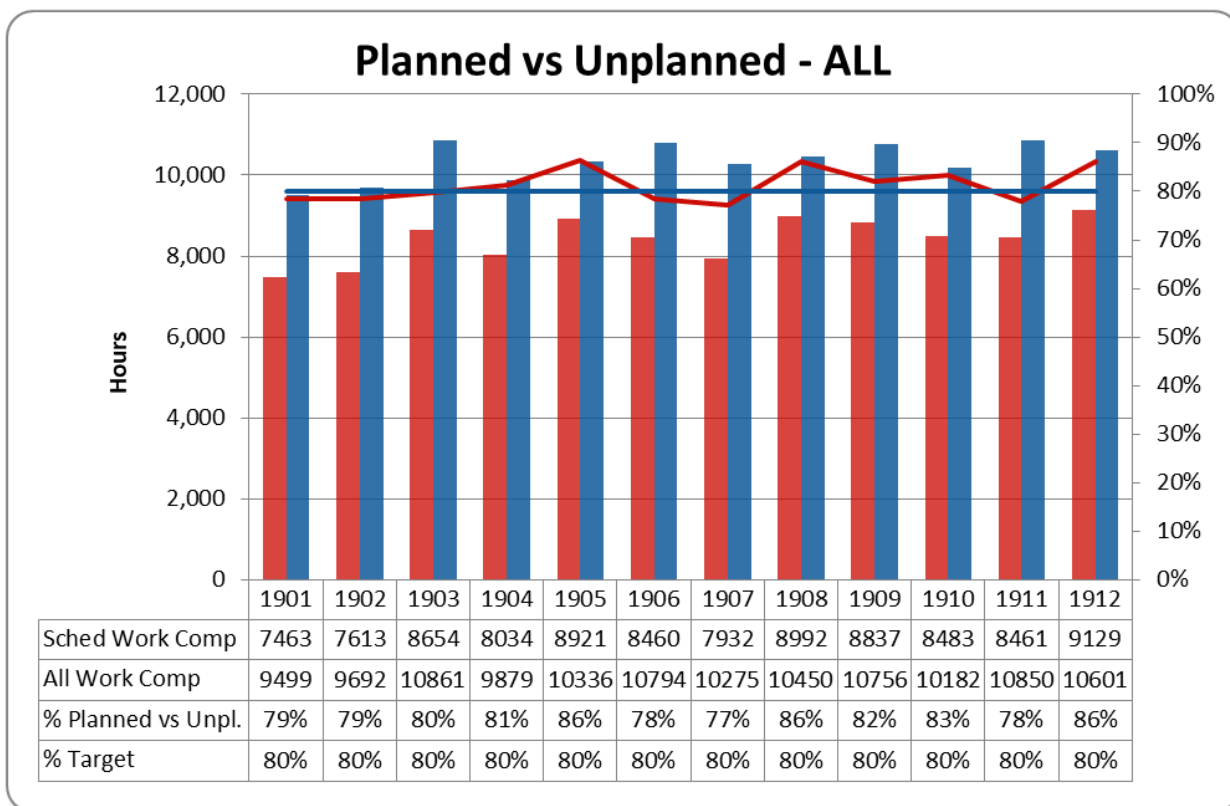
Name of KPI	Schedule Compliance
Formula	Sum of Scheduled Work Completed (Hours) / Sum of Scheduled Hours x 100
What it tells you	<ul style="list-style-type: none"> • Good indicator of planning and scheduling quality, whether the work plan is realistic and achievable. • Good indicator of maintenance effectiveness, whether they are able to complete the work allocated to them. • Should be read in conjunction with Planned vs Unplanned KPI to understand reasons why Schedule Completion is low.
How to use it	<ul style="list-style-type: none"> • Measure as a percentage, compare to a target, trend over time. • Target is normally 80-90%, can be adjusted per work team. • If below target, investigation is required.
Typical reasons for low results	<ul style="list-style-type: none"> • Insufficient labor assigned to scheduled work orders. • Excessively efficient completion of scheduled work. • Schedule loading too high. • High volume of unscheduled work.
Typical reasons for high results	<ul style="list-style-type: none"> • Excessive labor assigned to scheduled work orders. • Inefficient completion of scheduled work. • Schedule loading too low.



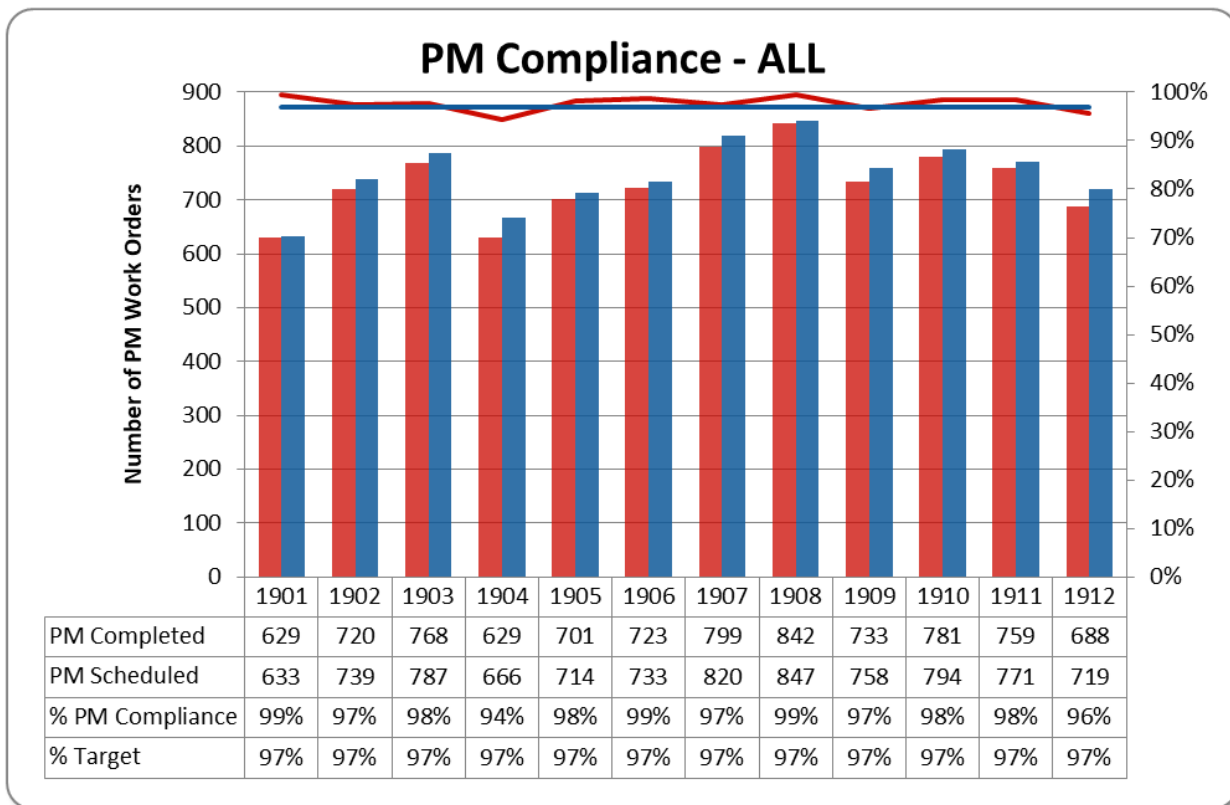
Name of KPI	Schedule Loading
Formula	Sum of Scheduled Hours / Sum of Available Hours x 100
What it tells you	<ul style="list-style-type: none"> Measures whether an achievable amount of work is scheduled for each work team. Target is normally 80-90%, can be up to 100%. If the schedule loading is low, this indicates poor scheduling.
How to use it	<ul style="list-style-type: none"> Measure as a percentage, compare to a target, trend over time. If below target, investigation is required.
Typical reasons for low results	<ul style="list-style-type: none"> Inaccurate scoping of work orders with insufficient planned hours. Not enough man hours have been scheduled. Inaccurate measure of available hours (high).
Typical reasons for high results	<ul style="list-style-type: none"> Inaccurate scoping of work orders with excessive planned hours. Too many man hours have been scheduled. Inaccurate measure of available hours (low).



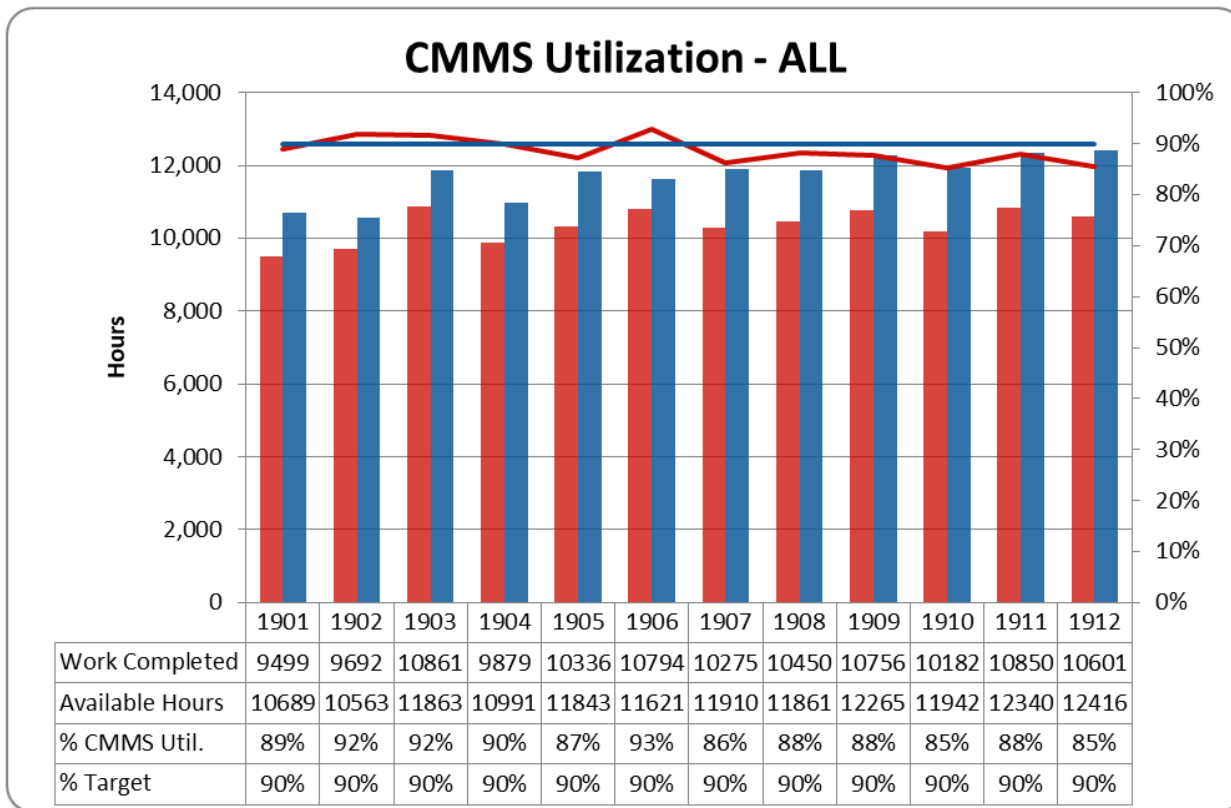
Name of KPI	Planned vs Unplanned
Formula	Sum of Scheduled Work Completed (Hours) / Sum of All Work Completed (Hours) x 100
What it tells you	<ul style="list-style-type: none"> • Good indicator of how reactive a work team is, and how much unscheduled work is breaking into the work schedule. • If this KPI is below target, the ability to complete Scheduled Work decreases.
How to use it	<ul style="list-style-type: none"> • Measure as a percentage, compare to a target, trend over time. • Target is normally 70-80%, can be higher. • If consistently below target, investigation is required.
Typical reasons for low results	<ul style="list-style-type: none"> • Large amount of man hours spent on unscheduled work. • Insufficient Schedule Loading.
Typical reasons for high results	<ul style="list-style-type: none"> • Small amount of man hours spent on unscheduled work.



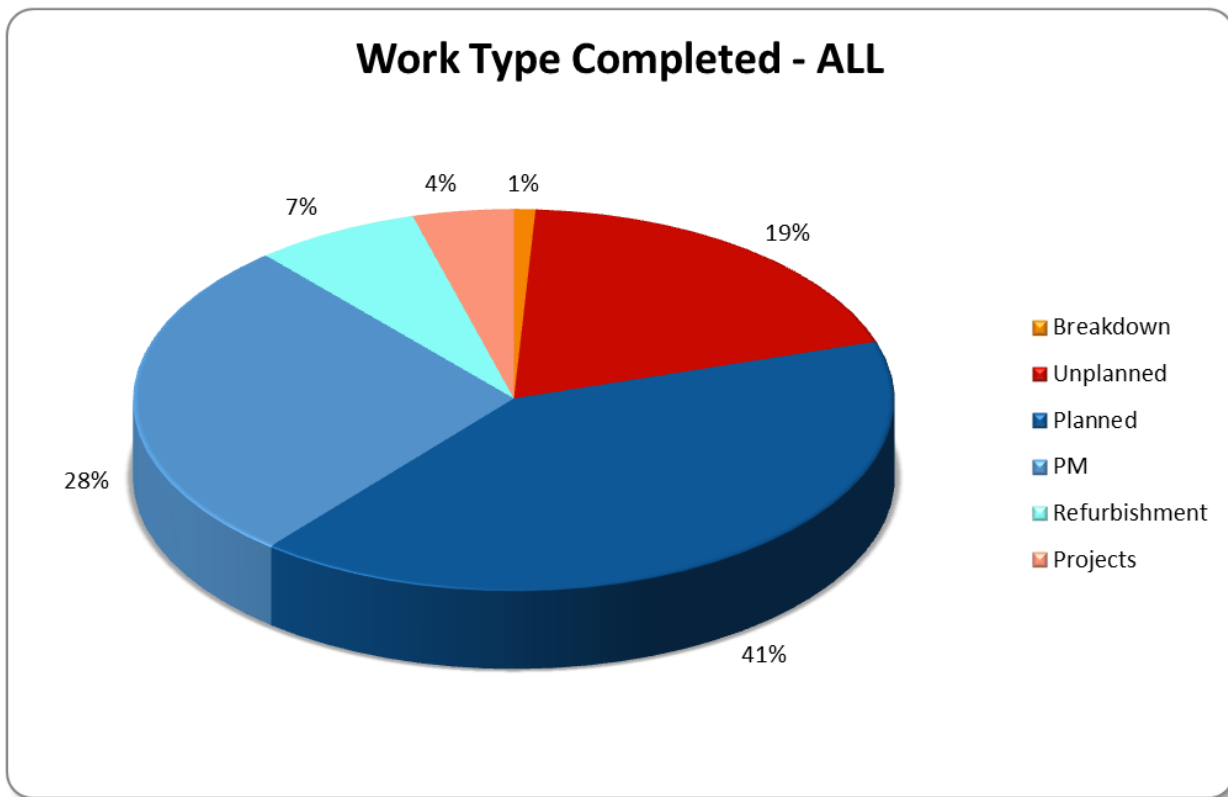
Name of KPI	PM Compliance
Formula	Count of PM Work Orders completed / Count of PM Work Orders scheduled x 100
What it tells you	<ul style="list-style-type: none"> • Good indicator of whether work team is prioritizing completion of PM Work Orders.
How to use it	<ul style="list-style-type: none"> • Measure as a percentage, compare to a target, trend over time. • Target is normally 95% or higher, can be adjusted per work team. • If consistently below target, investigation is required.
Typical reasons for low results	<ul style="list-style-type: none"> • High amount of unscheduled work. • Low Schedule Compliance. • Poor prioritization of Preventative Maintenance work.
Typical reasons for high results	<ul style="list-style-type: none"> • Good prioritization of Preventative Maintenance work.



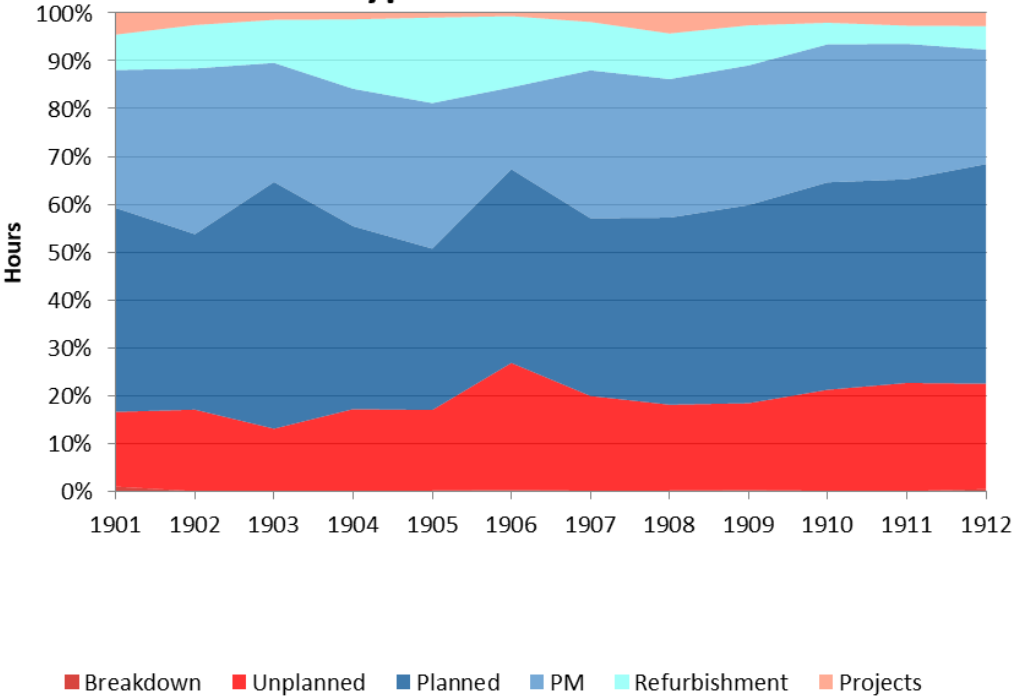
Name of KPI	CMMS Utilization
Formula	Sum of Work Completed (Hours) / Sum of Available Hours x 100
What it tells you	<ul style="list-style-type: none"> • Good indicator of whether sufficient hours are being entered onto work orders. • If CMMS Utilization is too low or too high, this will lead to inaccuracies to other KPI's.
How to use it	<ul style="list-style-type: none"> • Measure as a percentage, compare to a target, trend over time.
Typical reasons for low results	<ul style="list-style-type: none"> • Not all the actual man-hours available have been entered onto work orders. • Errors in the available hours.
Typical reasons for high results	<ul style="list-style-type: none"> • Too many actual man-hours available have been entered onto work orders. • Errors in the available hours.



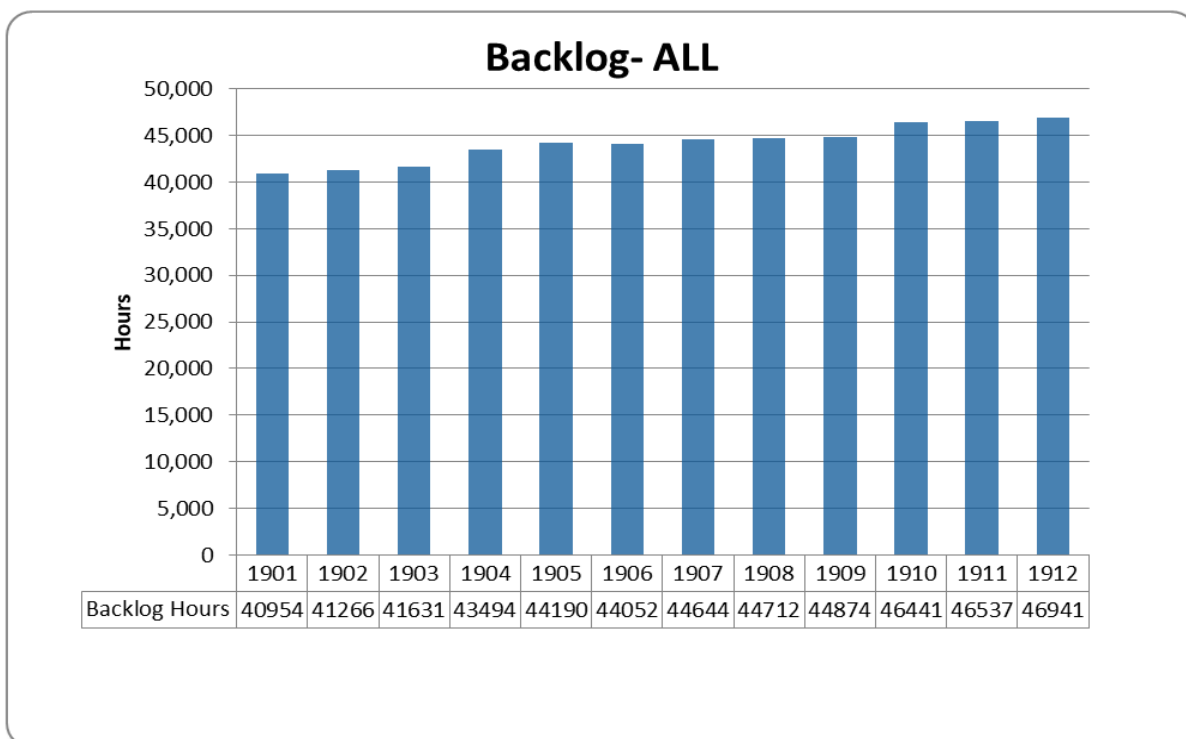
Name of KPI	Work Type Performed
Formula	Sum of Actual Hours for each different Work Type captured on All Work Orders during the scheduling period.
What it tells you	<ul style="list-style-type: none"> • Good indicator of where the work team spent their effort. • Identify if the work team spent too much time in unplanned work types. • Identify the trend for each work type, increasing or decreasing.
How to use it	<ul style="list-style-type: none"> • Measure as a percentage, trend over time.
Typical reasons for low results	<ul style="list-style-type: none"> • Work team is spending too much time on a particular work type.
Typical reasons for high results	<ul style="list-style-type: none"> • Work team is spending too much time on a particular work type.



Work Type Performed - ALL



Name of KPI	Work Order Backlog Size (or Forward Log Size)
Formula	<p>Sum of Incomplete Hours on Backlog or Forward Log</p> <ul style="list-style-type: none"> It is common practice to separate shutdown/turnaround Work from weekly schedule Work to form 2 different backlogs. Some maintenance departments prefer to leave incomplete Work Orders scheduled in the past, and refer to this as the Backlog. Some maintenance departments prefer to forward schedule incomplete Work Orders, and refer to this as the Forward Log.
What it tells you	<ul style="list-style-type: none"> Measures the volume of incomplete work. If incomplete work exceeds a pre-defined limit (nominally 6 weeks) then it generally means the work team is too small and requires increasing or temporary assistance.
How to use it	<ul style="list-style-type: none"> Measure as a trend. If the trend is ramping up, consider increasing the size of the work force to bring reduce the Backlog / Forward Log.
Typical reasons for low results	<ul style="list-style-type: none"> Low amount of work coming in. Work Force too large. High Maintenance Efficiency.
Typical reasons for high results	<ul style="list-style-type: none"> Large amount of unscheduled work breaking into schedules. Work Force too small. Low Maintenance Efficiency.



Name of KPI	Work Request Backlog Size
Formula	Sum of Work Request (Notification) Backlog
What it tells you	<ul style="list-style-type: none"> Measures the success of the work flow managing the incoming work requests.
How to use it	<ul style="list-style-type: none"> Measure as a trend.
Typical reasons for low results	<ul style="list-style-type: none"> Good management of incoming work requests. Efficient job scoping and approvals.
Typical reasons for high results	<ul style="list-style-type: none"> Poor management of incoming work requests. Inefficient job scoping and approvals.

