



Measuring effectiveness

It's not as simple as you think

How effective is your maintenance organization? While this is perhaps the most asked question, it's also one of the most difficult to answer. Many plants use key performance indicators (KPI) to measure the effectiveness of maintenance and other functional groups. However, the problem is that the criteria are often inappropriate, based on faulty calculations or not applied universally throughout the organization.

Preventive/predictive maintenance ratios

Many plants measure maintenance effectiveness by calculating the percentage of preventive and predictive activities to the total amount of maintenance activities. World-class plants have a preventive and predictive maintenance (PPM) ratio of 80 to 85 percent.

In some instances, preventive and predictive tasks are divided into separate classifications. While this provides better detail, either method is effective when used properly.

The PPM ratio assumes that all preventive and predictive maintenance tasks are valid and provide measurable benefits. Historically, this is not true. In a typical plant, 33 to 42 percent of preventive

tasks do not meet this criterion. This is especially true of lubrication, inspections, calibrations and adjustments, which comprise the majority of preventive maintenance tasks.

Making the PPM ratio a valid measurement requires eliminating unnecessary tasks, verifying task frequencies and providing sufficient detail and enforcement to ensure universal application and adherence to best practices.

This method also ranks tasks or activities equally in terms of effectiveness. Preventive and predictive tasks should be weighted to account for the criticality of equipment and reliability issues. This will ensure that critical tasks are preformed in a complete and timely manner.

Planning ratio

The planning ratio is the number of planned activities as a percentage of total work activities. Many plants have adopted it to quantify and track maintenance effectiveness. However, defining the term "planned" can be problematic.

To be effective, this criterion should define activities as planned tasks only if they are "fully" planned. By that I mean that tasks are well defined, work proceeds in



a logical sequence, materials, tools and permits are available, and proper labor hours and skills are allocated.

The three primary reasons for unplanned maintenance tasks are:

- Emergency or breakdown work.
- Call-outs or add-on work.
- Planner fails to plan a task.

Emergencies and breakdowns are a frequent cause of unplanned work.

Call-outs during normal production hours and add-ons during maintenance outages also contribute to unplanned maintenance work. Including them into the planning ratio may lead to incorrect conclusions.

The third cause is within the control of the planning function and is a valid measure of planning effectiveness.

However, one way to resolve these issues is to track each as a subset of the planning ratio.

Maintenance budget ratio

This is the maintenance budget



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as a percentage of the facility replacement or insured asset value. It implies that maintenance budgets will be based on

the facility's replacement or insured asset value. In world-class plants, the maintenance budget is based on the preventive and

predictive maintenance tasks required to maintain plant production systems properly. Proper tasks and intervals obtain optimum life cycle cost without sacrificing reliability.

Many plants track maintenance costs as a percentage of replacement or asset value. However, it's difficult to determine the real replacement or asset value is for a particular plant. When attempting to compare multiple plants, it's imperative to standardize calculation methods.

The cost of world-case maintenance is between 1.5 and 2.0 percent of replacement value. This benchmark budget includes all maintenance costs (direct labor, material, overhead, fringe benefits, clerical and supervisory personnel, etc.).

These are only a few of the KPIs used to quantify maintenance effectiveness. When used properly, they provide an accurate indication of performance. When used improperly, they can hide serious deficiencies. The former is a necessary requirement of continuous improvement. The latter is a sure way to assure that nothing will ever change. ☺

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