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Maintenance KPIs and Ratios

Maintenance benchmarks include costs, parts, work, and customer service measures.

Customer service measures

Breakdown report
The core service that maintenance provides its customers is freedom from breakdowns and quick, effective service when a breakdown occurs. Breakdown reports can take many forms, from breakdowns with causes and response times to MTBF (mean time between failures) with additional MTTR (mean time to repair) information. In all cases, a breakdown should be treated as an educational opportunity to see where (if at all) the system failed.

Number of service calls
This simple KPI can tell maintenance and user departments how effective maintenance is at foreseeing problems and correcting them before they occur. This benchmark would be factored by significant changes in size, equipment, or mission of the organization being served. Another consideration is any change in the experience of the operators.

Mean time to respond (MTR, by priority)
How long does it take to respond to a service call from when it is phoned in (or emailed) to when a service person shows up? In some organizations, this is a significant way the maintenance department is rated. MTR is a measure of the friction of your business process.

Mean time to repair (MTTR)
Once a response has been made, how long does it take for the customer to be satisfied? When this is added to MTR, you can understand how long your customers are unsatisfied. MTTR also measures your team's troubleshooting, maintenance expertise, tooling, access to spare parts, and travel.

Callbacks % Callback
The bane of maintenance is rework or callbacks. A callback is a service person's return to a unit for work on the same system or related system as their original work. Callbacks can be a problem in the workmanship, part, procedure, or asset design. In any case, the reason has to be uncovered and fixed. This ratio trended over time to indicate whether the problem was being addressed. Callback percentage is a David Peterson measure. He states that world-class organizations average 3%, with the target being 0%.

Maintenance satisfaction survey

The maintenance satisfaction survey is an ongoing (or annual survey) of attitudes toward maintenance. This KPI measures the effectiveness of your communication about maintenance.

Costs

Maintenance cost per unit output (tons of steel, yards of garbage, patient days, ton-miles)

For industries that produce bulk products (like mining, refining, etc.) or easily countable products (like packaged food, automobiles, etc.), cost per unit output is the primary measure of maintenance effectiveness.

Assets used to make a product or provide a service require maintenance to continue production. This usage creates a need for an investment for every unit of usage. Your usage unit could be making bricks, processing policies, or delivering blood. That activity can be related to using the asset (such as a building, truck, or kiln) needed to provide that product or service.

In many industries, the maintenance cost per car assembled, hundred packages delivered, or thousand barrels of beer brewed is well known, discussed, and understood. Cost per unit output is a David Peterson measure, which he calls maintenance contribution to cost per production unit. He also has a related metric called maintenance cost-effectiveness, which compares actual cost per unit output to calculated cost per unit.

Maintenance cost index

The maintenance cost index is the most common measure of traditional maintenance departments. It plots the total maintenance cost for the last few years, perhaps by quarter. It is still helpful to show what is being spent. You combine that information with what else you know, and it becomes another data point. The maintenance index trend would be beneficial in times of lower change and known inflation. Today, there are so many variables that the trend is almost meaningless. Many companies still keep it.

Maintenance cost to budget (by line)

The most common benchmark is how we are doing and how we said we would. Variance reports show where problems might be developing.

Maintenance costs per square foot

In an office, hospital, school, shopping center, or apartment building, the maintenance cost varies with size instead of other measures. It is tough to relate maintenance costs to dollars sold in a department store or dollars of stock sold at a stock broker's office. In these cases, the maintenance costs per size are the best to track.

The ratio of maintenance costs to Replacement asset value (RAV)

RAV= Replacement Asset Value (the cost in today's dollars to replace the entire asset). Divide the RAV by the maintenance budget. The result is typically between .5% and 4%.

This ratio can give a gross analysis if adequate maintenance is being invested. World-class organizations with mixed asset bases run around 2% in this ratio.

It is an advantageous ratio if your organization is buying buildings and other assets and you want to keep ahead of problems.

The ratio of maintenance people to asset value
Another way of looking at this is to see how many people it takes to maintain $100 million of this asset or how much asset value each maintenance person is responsible for.

Parts

Maintenance labor to parts
The ratio of labor to parts is helpful when added to other knowledge because it provides input into formulas to estimate budgets for new buildings, fleet expansions, or plants.

Inventory Turns
While maintenance inventory differs from retail inventory, the analysis of turns is practical when insurance policy stock is removed from consideration. After that removal, the turns should be approximately reflective of an industrial distributor.

Purchase to issue ratio
The purchase-to-issue ratio is an advanced indicator of inventory accumulation or depletion. If you are trying to reduce your inventory, you must run this ratio below 1.

Work ratios

Many measures deal with the ratios of various types of work. The question is -how do you spend your time? It is essential to see how the mix of work is showing improvement.

Planned maintenance hours % Planned hours
Planned hours from all sources should exceed 80% of the worked hours—the detailed breakdown in the next measure.

Emergency hours %, Emergency hours unscheduled

DIN (Do it now) hours %, DIN unscheduled

Short repair hours %, Short repairs scheduled

CM (Corrective maintenance) hours %, CM scheduled

Preventive maintenance hours (PM) %, PM scheduled

The typical expression of the types of work is a PIE chart.

The first critical breakdown is planned (PM+CM+Short repair+Project) to unplanned (DIN+EM). This ratio shows how much your facility is ahead of the breakdown curve or how much unscheduled events dominate you. The trends of these numbers give you a feel for whether there is improvement.

Personal service work %, PS hours
Personal service is a measure of maintenance people doing support functions that are not maintenance-type work. PS might include setting up holiday decorations, picking up people at the airport, or running errands.

Project/Capitalization work % Project/Capitalization
A second measure is how much non-maintenance work is done (this would include PS and Capital). If the ratios look too large, there might be money-saving opportunities in reviewing the details.

Total backlog by craft (in hours, weeks per person)
Many experts believe that managing the backlog (work immediately available to be done, including pending) might be one of the most essential jobs of maintenance leadership. The amount of backlog should not fall too low (1 week per person) or too high (3+ weeks). How to Manage Maintenance says that low or no backlog indicates overmanning, and more than 10 days indicates overtime is needed.

If people see the backlog running out, they slow down to avoid layoffs. If the backlog is too large, the user's routine work doesn't get done quickly or reliably. Increased backlog is one reason to authorize contracting or overtime.

One calculation issue is whether to use the available time or 8 hours. Calculations show an eight-hour day is reduced by 1 hour and 20 minutes from meals and actual breaks, as well as an additional 30 minutes from meetings and other information exchanges. An actual workday might be closer to 6.0-6.5 hours. When a ten-person crew has a 490 hr backlog, we will calculate that they have about 8 days (using 6 hr/day), not 6 days (using 8 hr).

Overtime % Overtime
Unscheduled overtime (or scheduled overtime) % Unscheduled overtime
Overtime is an interesting indicator because some natural overtime (3-9%) indicates that you are adequately crewed in most maintenance situations. Natural means that people are not slowing down to create overtime. If there is no overtime, the temptation is to think there are too many maintenance people for the workload. Of course, this does not include organizations that artificially restrict overtime. Unscheduled overtime for emergencies is a problem because it not only shows a lack of planning but also a lack of control over deterioration. Don Nyman recommends 6% overtime.

Contractor ratio

What is the ratio of contractor hours or dollars to in-house work? Your budget design should predict the amount of contractor work in a given year. The ratio is only important as it relates to your prediction. If you predicted 10% and the last few months have been coming in at 50%, there had better be a bunch of construction projects going on that were approved after your budget.

Hourly to support people ratio

Hourly to planner Planners = ~5% of labor hours

Hourly to supervisor (span of control): 1 Supervisor for 10 workers

Excess support staff sometimes gets in the way of productivity. One area of savings may come from moving the support staff back to the floor if possible. Other measures, such as hourly to planner and span of control, can help you sharpen up your support ratios and optimize the amount of backup your mechanical staff has.

Jobs waiting (by reason)

One of the problems of maintenance work is the number of hand-offs of maintenance jobs in extensive facilities. The job goes to planning, who determines that it needs engineering, who passes it back to planning, who passes it to purchasing, etc.

The waiting time between steps is what kills speed. The customer waits, and no one can easily tell them where the job is. The Jobs Waiting, report helps highlight the problem areas and can indicate opportunities for reengineering.

Open work order hours

An open work order is related to an area assignment. A machine might have an open work order for each month's work. Usually, the goal is to minimize open work orders in most situations because of the loss of control. The exception might be in routine work of a known content and duration (such as line start-up or policing the parking lot for glass).

Accounted for hours (Payroll hours/Work Order hours)

Use of Work Orders % labor hours

The first measure after you install a work order system is the ratio of work order hours to payroll hours. It should rapidly increase to 90-95% (some say to 100%). That way, you know all of the hours are somewhere in the system (at least). Be sure people are not pencil-wrapping the work orders (at the end of the day, just whipping through and putting 2 hours on each of the four work orders to get 8 hours).

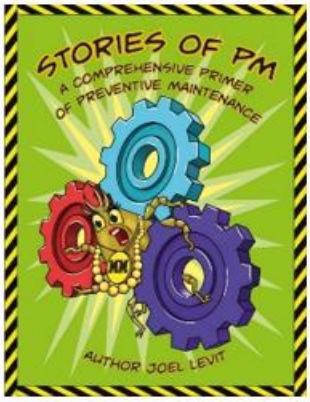
Effectiveness (work order hours/standard hours)

The effectiveness ratio can be helpful when most jobs have good standards. It shows how much work is done. You get 3 hours credit for three standard hours even if the job took 16 hours. In this way, slowdown problems are subtracted from your output calculation.

Crazy, Fun Books teaching maintenance fundamentals

From the series: "Elements of Great Maintenance Management"

You can tell from the covers these books are different than everything else you've seen.

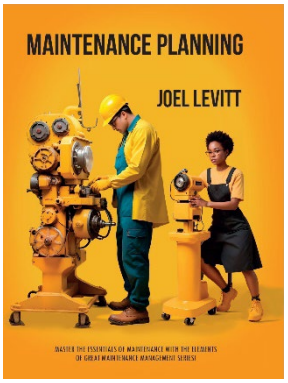


Preventive Maintenance

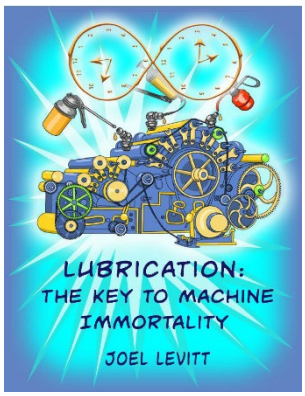
Defect Elimination

Reliability and fundamentals

Maintenance quality



Maintenance Planning



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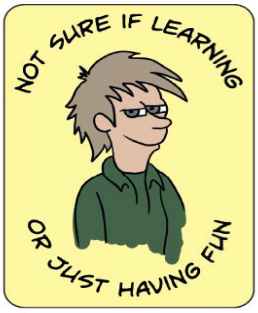

We know:

- Old-school books and manuals don't cut it.
- Boring texts don't cut it.
- Humans learn best with stories.
- New students want ***entertrainment!*** (I made this word up from Enterainment + Training)

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