

# Maintenance Scorecards: Measure What you Manage



Scorecards offer an easy way to track and evaluate maintenance effectiveness. Here's how to put them to work in any industrial environment.

*By Mike Cowley, Contributor*

Industrial maintenance is getting beyond the days when it was called to action only when equipment failed. Plant managers know that maintenance plays a key role not only in equipment uptime, but in production and overall plant efficiency. Nonetheless, it can be difficult to determine the real effectiveness of even top maintenance crews without a way to measure what they do, how well they do it, and how their actions further company goals.

A measurement technique many pros use is the maintenance scorecard. Maintenance scorecards either in electronic format or actual cards marked by hand are used for two main reasons: first, to measure performance against established goals; and second, to help justify obtaining additional resources to assist a maintenance team on its mission of continuous improvement. Both of these are critical to maintaining staff and capital expenditure levels. Over the years I have used maintenance scorecards to justify the following:

- Capital expenditures when production equipment maintenance costs were rising
- Additional overtime hours and pay for PM and PdM (predictive maintenance) work when manufacturing demands would not allow it on straight time
- Increased maintenance training when lack of knowledge was causing increased production downtime
- Additional contractor assistance when backlog man-hours were on an upward trend
- Hiring planner/schedulers to improve maintenance efficiency
- Increased stock of maintenance supply parts when machinery downtime waiting on parts became a concern
- Vibration and infrared programs were justified based on savings from equipment history of catastrophic failures
- Component or system reengineering were justified based on equipment history of repeat failures

## Prerequisites

If maintenance scorecards are to assist in measuring maintenance performance and justify equipment expenses, they must be rooted in objective, detailed information. A key part of the information gathering process involves use of a properly installed and maintained CMMS (Computerized Maintenance Management System). The operation of the CMMS must be disciplined and driven by the passion that leads the overall maintenance improvement initiative. Basic information categories include:

- Maintenance labor:* All work assignments completed by the maintenance team must be captured by the CMMS. If the normal maintenance staff works a 40-hour week, the entire 40 hours must be captured by the CMMS. All work performed during that time period must be properly recorded and categorized to display the type of work completed in this time period. Special effort must be taken to minimize the number of standing work orders issued for maintenance activities. It is a common activity, for example, to issue standing work orders for assignments that appear to be routine, such as second- or third-shift maintenance coverage. But because management personnel are typically not present to analyze completed work or trouble calls, off-shift work can be misrepresented. In reality, off-shift work orders contribute a significant amount of overall maintenance history, and should not be minimized.

- Maintenance repair parts and supply costs:* Capturing the cost of all maintenance parts and supplies associated with each work order is as important as knowing the cost of maintenance labor. If you can capture total labor costs as well as the repair and supply costs for each work order, this leads to what I call the "true cost of maintenance." However, this measurement is one of the most elusive in the maintenance management world. Many companies capture the labor cost or the supply cost by department, but few capture the true cost which combines both. Once this cost is determined, everything is in hand to allow

accurate, intelligent decisions about equipment and the manufacturing facility.

•*Contractor costs:* Contractor costs can be significant and, sometimes, hidden. As an example, if an electrical contractor is hired to replace or remove and rewind a motor, the contractor cost must be captured in the total maintenance cost of that piece of equipment. This cost can be captured easily with a work order that is written and coded to reflect it as a contractor expense and added to the machine or component history. Failure to capture this cost means the total cost of maintenance is misrepresented. This impacts budgets, and can leave those in finance wondering what maintenance does with its money!

### **Key maintenance scorecards**

There are hundreds of potential scorecard measurements available to a maintenance team. And while every industry likely will have unique measurements and scorecards, those explained below are the top scorecards, with applications in all industries and in most facilities. They include:

*Backlog* The backlog measurement should be calculated in man-hours or man-weeks. Even though this work may not have been reviewed or planned by a maintenance planner, estimated man-hours should be placed on the work order when it is received in the maintenance department. An experienced maintenance technician or planner should be able to make such estimates rapidly. The main use of the backlog scorecard is to keep a constant eye on the amount of work waiting to be completed.

Having a reasonable amount of backlog work is good because it assists the maintenance effort by allowing time for proper planning, ordering and scheduling of work. If a backlog grows too large, it can become justification for increasing overtime or contractor labor, or for hiring more technicians. If a backlog is too low, it could mean that current work load needs to be analyzed. Perhaps work orders that should have been written were not. A low backlog could also suggest that the maintenance staff is too large or receives too much assistance from contract labor. Backlog scorecards should be categorized in several ways, such as by craft, department, machine, building, shift, type of work and others.

*Machine downtime/uptime* Choose a perspective, then establish a method of reporting it. The primary use of maintenance downtime or uptime reporting is to see if maintenance improvement efforts are having an impact on the manufacturing effort. This is a great tool to assist you in justifying maintenance improvement ideas and efforts in the future. Consult with manufacturing to develop a measurement they will accept or ask them to supply this information. This way, your scorecard will never be questioned by manufacturing, though it will be questioned by the maintenance team. To keep everyone honest, I recommend maintenance team leaders do their own reliability audit from time to time.

*Work distribution* The work distribution scorecard provides a constant status on the types of work for which crew members are allocating time. Common categories include: scheduled work, unscheduled work, project work, PM, PdM, emergency and interrupts. It is also valuable to organize work by craft, such as electrical, mechanical, metal work, carpentry, etc. Any sustained rise or drop in work distribution levels is another tip that the current maintenance strategy should be reviewed.

*Interrupts* An interrupt refers to any work completed on a work order that was not scheduled for that order. Interrupts can be tracked in many forms, from man-hours to incident occurrences, and should be identified by machine, department, shift, craft and priority of interrupt. This scorecard should trend in a similar fashion to the machine downtime scorecard, and is useful for justifying overtime or additional repair costs.

*Schedule effectiveness and compliance* Useful only after work has been scheduled, this scorecard compares total maintenance man-hours available to total man-hours placed on the work schedule. It also compares total man-hours on the schedule to total man-hours completed on the work schedule. The obvious goals are to schedule as much of your work week as possible and complete 100% of what is scheduled. Variances from this could indicate problems with staffing, resources or scheduling.

*Percent PM work* This scorecard is designed to track the weekly man-hours assigned to preventive and predictive work assignments. Over time, you will see a direct correlation between this measurement and your downtime and interrupt scorecards. The effort placed in seeing that this trend is always moving up will be rewarded with lower downtime and reduced amounts of unscheduled work.

*Pareto analysis of interrupts and downtime* - The Pareto analysis is one of the most useful scorecards in assisting the maintenance team in lowering downtime and interrupts. Vilfredo Pareto was an Italian economist and sociologist in the 19th century. Applying his theories to the current maintenance world means that 20% percent of your equipment is causing 80% of your problems. This scorecard displayed in graphic form is an excellent method of seeing where your problems occurred yesterday, this week and this month. Pareto analysis will assist you in rapidly assigning resources to correct or reengineer operation and design deficiencies in equipment and facilities.

*Cost of maintenance vs. ERV* This scorecard is less common in the maintenance arena, but offers another valuable perspective on maintenance costs. ERV is the "estimated replacement value" of a piece of equipment or component of that equipment. The theory behind creating a scorecard for this metric is that a known replacement value serves as a cutoff point for maintenance expenditures. For example, if the replacement cost of a piece of equipment is \$10,000 and maintenance costs are \$4,000 per year, a case could be made for replacement.

*Cost savings* The most subjective of all the measurements discussed in this article, this is based on documenting savings for repairs that were averted. The object is to show as realistically as possible the amount of money the maintenance team has saved the company because of its proactive maintenance approach. For example, assume that during a routine, scheduled vibration analysis of a plant's chilled-water pumps, a maintenance team member finds a 100-hp circulating pump that he is sure will fail within six months due to an outboard bearing failure. Continue to assume that the bearing is replaced during a scheduled downtime. What did the maintenance team just save the manufacturing facility that cannot operate without this pump? Who knows what the cost of downtime in your facility is? It depends on the facility and operation, but it is known that the bearing replacement saved at least the cost of pump repairs. By establishing a conservative dollar savings to the pump repair job and others, you can develop a history and a justification of maintenance improvement programs. The key is to be realistic with savings calculations. There's no need to exaggerate, because even conservative savings mount quickly.

*Inventory control* Inventory control scorecards are extremely helpful in ensuring that the maintenance team has the repair parts and supplies they need to maintain the plant's equipment. This group of scorecards includes items like part turnover, stockouts, service level, inventory accuracy, backorders, slow moving parts, work orders waiting on parts, downtime waiting on parts, and many other items. The bottom line is that the average maintenance crew wants every part they require whenever they need it. This is not economically feasible, of course, but the greater number of critical parts that are available only increases the positive effect maintenance will have on production machine uptime. Getting control of this measurement is one of the most difficult, but if you can break into the supply-chain management bubble, it can yield enormous results.

With scorecards, it's key to remember that they must be meaningful to the maintenance team and, ultimately, to manufacturing management. To get started in the scorecard business, you must have a vehicle in place to provide the information necessary to properly measure all aspects of the maintenance function. A properly installed and maintained CMMS is essential to this process. And if you take only one thing away from reading this article let it be this: You cannot manage what you cannot measure.

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## **IMPO**

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