"DOLLARIZING" MAINTENANCE

If you want to take Maintenance to the next level at your facility, learn to express your operation's impact in dollars. Why? Decision-making at the boardroom level always involves some degree of cost/benefit analysis. Your ability to present senior managers with a crisp financial description of even mid-level departmental work — being able to talk their language, in other words — will do a lot to boost your persuasiveness in the budgetary process.

Author:
Terry Wireman

Learning to "dollarize" each maintenance cost center and function brings you another important benefit: an invaluable benchmarking tool for your own decision-making. You'll gain a new means of predicting the impact of projects and of assessing the results. Conversely, the inability to construct and follow a sound business model will orphan many otherwise worthwhile initiatives for lack of the needed rationale. Your operation will either miss out on valuable cost-saving opportunities or it will be lured into costly mistakes. The choice is yours. Thinking in such a financial style may be alien to nuts-and-bolts minded maintenance managers, but that doesn't mean that the task is beyond your grasp. Far from it! Here are a few basic how-to tips on effective "bean counting" for plant maintenance projects.

Looking at the Numbers

If you want to take Maintenance to the next level at your facility, learn to express your operation's impact in dollars.

There are three levels of plant maintenance activity that can be financially evaluated, with each level characterized by its relative importance. At the highest level we find critical production equipment. Here, the value of efficiency — or lack thereof — is magnified. For these projects, the formula applied is called Overall Equipment Effectiveness or OEE (see more, below). It's probably the best developed and most-closely-scrutinized index of maintenance reliability.

The next level involves the maintenance-specific functions. Less attention has been paid to monetary impact at this level because the scale is less dramatic. But you can measure return-on-investment that is derived from advanced maintenance efforts — for example, predictive maintenance (PdM) or total produc-tive maintenance (TPM).

The same is true at the "bottom" or most basic level: The dollars you spend on routine preventive maintenance (PM) and other maintenance of non-production systems can also be expressed in terms of profit and loss.

It's advised to start at the top level, calculating OEE separately for each production machine or system. Use the formula

OEE = Availability x Performance Efficiency x Quality Rate

Availability

Availability is the percentage of the time that equipment actually runs, against the expected or scheduled run time. You should strive for at least 90 percent availability. To calculate availability at your facility, take the scheduled uptime of, say, two shifts a week — or 80 hours — and divide it by the actual uptime (note: subtract from both figures any scheduled maintenance shutdowns).

Another key-point: Many production plants run less than a 24/7 schedule, of course, but it's advised to express the top of the Availability fraction with the maximum potential of weekly hours.

So, round-the-clock, 24/7 availability might equal 168 hours per week instead of only the scheduled time.

This approach — using a maximum potential figure — expresses the true availability of the plant's equipment, rather than hiding it behind spurious calculations. Although the resulting fraction is now smaller and perhaps less impressive looking, there is a benefit: It alerts the boardroom to the fact that underutilized plant capacity remains, perhaps preventing management from launching an unwarranted expansion.

Performance efficiency

Performance efficiency refers to the percentage of the rated or designed equipment spec for output that is actually being attained. For example, a machine may be designed to produce 100 "widgets" an hour, but what does it actually yield? Your goal here should be at least 95 percent of the ideal.

The rated design specs may be inaccurate or long ago forgotten, especially with older equipment. If possible, try to recover the original rating in order to reach a truer benchmark. Another point to be wary of is the fact that sometimes an ingenious technician has re-engineered performance to make a system yield more widgets than it originally could. If so, you'll need to adjust the top of the fraction. If you don't, the resulting reliability rating will be inflated.

Quality rate

Quality rate refers to the fraction of the product output that meets the acceptable first-pass quality standard. In percentage terms, put the "perfection" figure (i.e., zero rejects) on top and divide by "passed" or acceptable units.

The result should exceed 99%. When adding up the number of acceptable passed units, don't include any reworking, re-filtering, repackaging, or reformatting, that isn't first-pass quality.

Following a Case in Point

Now, for an OEE example. Let's say the figures for the facility are as follows: an availability rate of 85%, a performance efficiency level of 90%, and a quality rate of 95%. This yields the following computation:

.85 x .90 x .95 = 72.6% OEE

That number now serves as a baseline and benchmark. You can focus your maintenance efforts on improving each term. As a comparison point, world-class maintenance is now defined as achieving an OEE of 85% or better.

However, although you now have a starting index, your financial translation isn't done yet. You need to express that 72.6% in dollars. To do this you'll need to know the market value of each piece that the equipment puts out.

Determining this may be tricky in that accountants tend to use a variety of costing methods. Ask them for appropriate unit pricing. What's important isn't which way you do it, but you want to use one system consistently. This ensures that you're comparing apples with apples in your work-valuation measures.

Multiply the unit value that they give you by the actual output quantity during the period in question — whether a week, month, or year. For example, suppose the equipment, when operating at 72.6% OEE, puts out 15,600 pieces per week, each worth $12. Your world-class target is an OEE of 85%. Arithmetically, that's an additional 7,800 pieces per week. Achieving this will add annual revenues of $12 x 7,800 x 50 week/year — or $4.68 million.

Although simple, OEE will prove itself a powerful management tool for prioritizing and doing cost/benefit studies. You can use the figures to support budget requests for additional staff, training, or tools. Moreover, whenever financial people want to know the impact of your efforts on the bottom line, the answer will be clear and understandable for them.

Expanding Your Effort

Next, you'll want to apply similar analyses to other *lower-level maintenance systems* — the difference now being that instead of counting production output (which doesn't occur, of course), you must establish some other suitable valuation theory.

For many, this will take the form of the cumulative expense generated by the system's operation. Hence, you're applying a kind of "negative OEE" formula.

For example, a heat exchanger or cooler does not produce an asset, but it may rack up hefty overhead costs for the needed cleaning, periodic maintenance, and eventual replacement. One way to quantify this expense meaningfully is to figure the cost impact of outright zero maintenance (i.e., "run-to-failure").

What will this "strategy of neglect" cost? Almost certainly it will...

1. Increase energy consumption due to decreased efficiency
2. Hasten a complete breakdown
3. Eventually necessitate either a costly repair or replacement

In addition, ignoring this system may also degrade air quality — with potentially expensive repercussions. For the greatest accuracy, strive to total the cumulative downside cost of this run-to-failure approach.

Now, against this expense total you can estimate the positive impact of performing work such as predictive tests, routine PM, and even TPM. High-quality maintenance will greatly extend equipment lifespan — but by how much exactly? And what is the comparative worth? Calculate this dollar payback as a function of the ongoing maintenance investment.

In the same way, calculate cost/benefit data for other equipment and functions facility-wide — pumps, mo-tors, HVAC systems, parts inventory levels, even relamping. What you end up doing, is "dollarizing" the maintenance operation, which, theoretically, can lead to your determining almost the exact hour at which you should do maintenance on that cooler or chiller or furnace, or whatever. Of course, by using this method you may also discover that you're doing excessive and needless maintenance on some items, as defined in pure dollar outlay. Your dollarizing approach should help you to detect and correct imbalances and wasted motion.

What's crucial in this approach is that your determinations are not based on what's convenient for the maintenance operation, but on what is best for the company bottom line. Thus, you're better able to communicate the significance of your department in the terms that key financial people find most relevant — and your analysis will often be eye opening to them.

Very few financial people understand production constraints or production values. Few understand the impact of poor maintenance and resulting downtime. But many will be surprised to see this kind of analysis coming from a maintenance manager.

A Case Study

The following case illustrates how learning to talk the language of top management — return-on-investments, in this case — can pay off in a big way:

A concrete company in Canada calculated the downtime cost of a tempering kiln at $10,000 of lost output an hour. Any shutdown for repair, followed by restarting, required a minimum of four hours. In addition, the local power company surcharged the firm annually to the tune of about $100,000 in penalties for the heavy demand caused by each startup.

The bottom line was, in one year they had to shut down perhaps six times, with a minimum of four hours of downtime each time — a staggering loss. The magnitude was so great, in fact that the company determined that the savings provided by a reduction of even a few hours of this downtime would easily pay for a full-time electrician and a backup mechanic to do nothing but preventive and proactive maintenance. During the year following these reassignments, not a single unplanned shutdown occurred, and the modest investment paid for itself many times over.

We see this type of thing all the time. Companies often work long hours of overtime or suffer prolonged downtime to recover from unexpected repairs — all in an attempt to avoid adding another body to the pay-roll. In reality, however, doing a cost study will often show that having another mechanic will save three or four times his or her added salary. When management sees those types of return ratios, suddenly the addition to your department's head count doesn't look so bad. But unless you can show them the total cost picture for the lost productivity, they'll never add that body because all they do is look at the overhead cost.

For more information on "dollarizing" maintenance, contact us today!