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How Maintenance Contributes to Financial Performance

Industrial operations that use physical assets for production or service delivery need their assets to run optimally, and cause minimal operational disruptions when they don't. Spending too little overall, or on doing the wrong things, always backfires. These short-term savings inevitably lead to breakdowns disrupting operations that cost much more in lost revenue than was saved by under-spending.

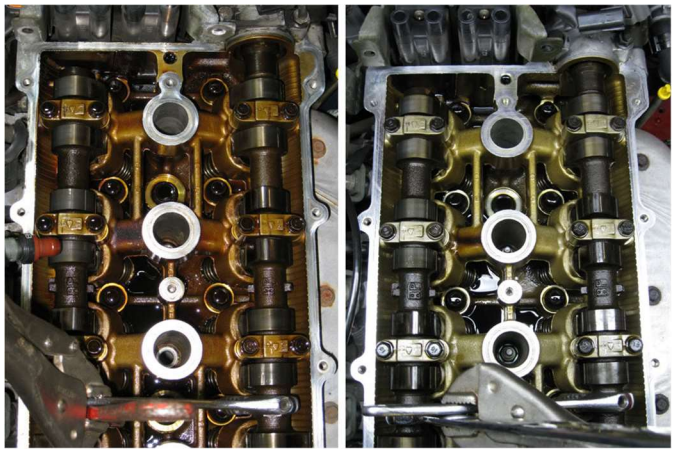
This article is intended to help financial managers reap the hidden benefits of 'proactive maintenance' and avoid the issues caused by reactive maintenance and under-spending. A proactive maintenance approach decreases the overall cost of maintenance without sacrificing asset performance / lifespan, or creating unsafe workplaces.

The key behind maintenance contribution to financial results lies in two basic facts:

1. Proactive work is less expensive than reactive work, and…
2. The more proactive work done, the less overall work is required, reducing budgets

All physical assets eventually age beyond their useful life. By catching failures before they result in major damage or losses, proactive maintenance keeps assets in good condition longer, extending their "useful life". Eventually, the cost of maintaining aging assets increases to the point that replacement is economically preferable to additional maintenance.

Reactive, (rushed or short cut) maintenance, (which includes the use of sub-standard parts and repair processes) detract from assets "useful life". *For example, in the photos below, the engine components on the right have been proactively maintained with clean oil, frequent oil changes and better filtering. The engine on the left was reactively maintained by simply recycling old oil. The visible accumulated dirt and contamination, corrosion, and lacquer coatings; reduces internal operating clearances and heat transfer, ultimately reducing the engine's "useful life."*



Proactive maintenance prevents extensive damage by implementing less extensive AND less expensive repairs. Well planned repairs, done on schedule, with quality replacement parts and workmanship return the asset to a state close to "as new" condition.

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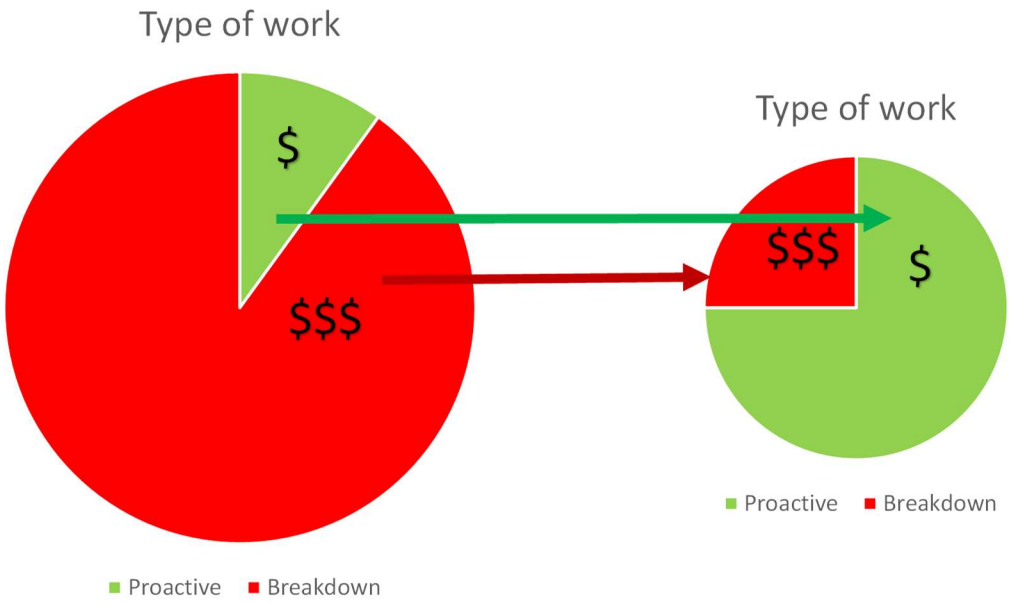
To illustrate, consider these two pie charts. Increasing the proactive (green) segment reduces the reactive (red) segment and shrinks the overall size of the pie (overall maintenance and reliability related costs).



Financial Contributions

Maintenance and physical asset management contribute to financial performance in 3 areas. This is a summary and details are explained below.

1. Capital and Balance Sheet
o Defer replacement capital spending – in the long-term, spending less
o Keep improvement efforts off the balance sheet
o Free up working capital

2. Income Statement
o Reduce costs
o Increase revenues
o Increase margins

3. Indirect Benefits
o Reductions in Safety and Workers Compensation Premiums
o Reductions in Environmental risk and compliance fines
o Enhancements in working environments
o Reductions in turnover and retention costs

Capital and Balance Sheet

Replacement Capital

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By keeping aged assets in top condition, proactive maintenance can defer their replacement; moving capital spending further into the future. *For example, proactive maintenance practices can result in extending replacement age of a fleet of vehicles from 5 to 7 years. This photo shows several haul trucks, each with a fixed carrying capacity. They are all loaded by the same shovel operating at a steady capacity. If you can keep each truck operating even only 10% longer, then each can carry 10% more capacity before replacement. So instead of using 40 trucks to achieve full capacity, if each operates 10% longer, only 36 trucks (10% fewer) are required for the same performance outcome. As each truck costs $3 - $5 million (depending on capacity) 4 fewer trucks are needed, for a big saving in capital outlay.*

Off balance sheet financing of improvements

Improvements that expand capacity and extend the life of capital assets are often capitalized and then depreciated as a non-cash cost over a period of time. If those improvements can be financed without capital outlay, non-cash balance sheet entries become cash expense outlays.

Maintenance is improved largely through changes to business processes and practices, training and skills upgrades, and the use of sophisticated technologies to detect equipment failure conditions sooner. If left to your own staff, improvements are often done piece-meal and gradually. Changes to the resultant asset performance therefore can upwards of several years to achieve. However, it is possible to move much quicker or start sooner. We can help to arrange funding so that it can be financed like a lease. You will be making an investment that save you in the long term. A smart consulting firm can help secure this type of financing.

Working capital

Proactive maintenance contributes to working capital by reducing current liabilities, lowering labor and material costs, reducing costly equipment failures, inventory values (the money owed to suppliers) and operating costs. *For example: reduced energy costs result from more efficient equipment operation; labor costs are reduced by keeping operators working vs.waiting for broken down equipment to be fixed, and maintainers are doing the lowest cost type of maintenance - proactive*.

The same actions that reduce the need for replacement capital also contribute to reduced working capital. Keeping assets running longer delays replacement costs. Keeping them running more reliably increases availability and useful output. In some environments

(particularly fleet operations or multi-shift plant operations) productivity can be increased with fewer operating assets and/or operating shifts.

Income Statement

Costs are reduced by shifting the focus from repairing breakdowns to preventing breakdowns, and from unplanned work to planned and scheduled work. On average the cost to repair breakdowns is at least 3 times higher than the cost of preventing failures. Breakdowns not only reduce income, they also put the equipment into “abnormal” states that are inherently dangerous and increase the risk of accidents (worker safety) and incidents (environmental). In addition, breakdowns can result in fines, risk to operating licenses, and in some cases, higher insurance premiums.

The goal of proactive work (preventive, predictive, detective) is to avoid breakdowns, as well as the operational and other losses and costs that accompany them. Proactive work is cheaper to perform and results in big savings. Good planning precedes effective scheduling which maximizes the utilization of the maintenance workforce. It increases maintainer “wrench time” (also known as “hands on tools” time) above industry norms of 32%, to as much as 60%. This additional productivity gets more work done in the same timeframe, shrinks work backlogs, and keeps costs low.

Increase revenues

Proactively maintained assets are reliable assets that require fewer repairs, fail infrequently and incur less downtime. Less downtime = more uptime = increased productivity, output and/or delivery services.

In a fixed plant environment, you can’t easily shrink the size of the plant, (as you could with the fleet of vehicles) so that increased capacity can be used to produce and deliver more. If you can sell all you produce, then your revenues will increase. But, if you can’t sell all you produce, how will you take advantage of your spare capacity? It can be sold or rented to other producers, thus keeping your assets running and fully utilized. Many are not so fortunate to have reliable operating plants! If that is not viable, you can use the spare capacity to produce more in less time and then lower your costs by reducing operational shifts. Spare capacity also offers the option of freeing the time required to perform proactive maintenance without interrupting production.

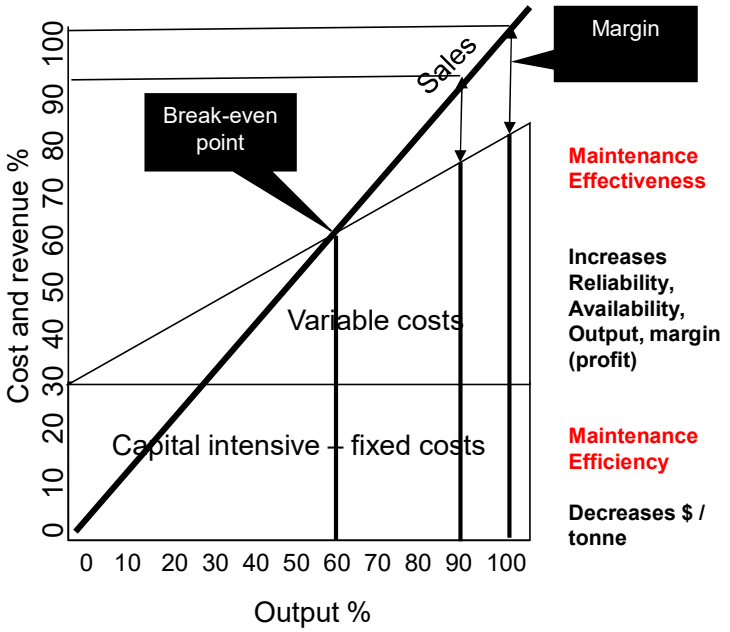
Increased margins

All of the above leads to increased margins.

Lowering Variable and Fixed Operating Costs

Variable operating costs, when charted, follow a more or less straight line sloping upwards as production levels increase. Each new unit produced costs a fixed amount more to produce. If the costs of producing those last few units of output are much higher than the costs of the first

ones, then you are probably running your assets too hard and causing too many breakdowns. If that's not the case, you can increase margins by lowering both variable and fixed operating costs.



Maintenance is part of both variable and fixed costs. If the assets are not being used, they need less maintenance. Idled assets must be maintained or they won't be available for use when you want them. The better the maintenance, the lower both fixed (doing the right preservation work) and variable (doing more proactive work and less breakdown work) costs will be. These savings contribute to reducing the slope of the total cost line. That line intersects with another line representing revenues. Graphically, revenue slopes upward from zero to 100% in more or less a straight line that begins near the origin your fixed costs

When total costs exceed revenues, you are not making money. As production increases your costs go up but (hopefully) at a lower rate than revenues. The revenue line crosses the cost line at the breakeven point. To the right of that point is your margin - an increasing gap between revenues and costs.

Lowering maintenance costs lowers the whole cost curve and moves the breakeven point to the left. Higher reliability lowers operating costs (moving the breakeven point further to the left) and provides greater availability. You can produce more, and move the production levels to the right where you have greater margins.

Indirect Benefits

In addition to the direct benefits to capital, income and costs, proactive maintenance delivers a number of indirect benefits.

Safety and Workers Compensation

Most industrial accidents involve slips on wet or "lubricated" surfaces, caused by leaks or spills. Workers trip over items left in walkways and other areas normally clear of obstructions, or fall while climbing on temporary scaffolding, ladders and other make-shift temporary raised platforms. These accidents tend to occur in conjunction with maintenance work. Rushed and unplanned the work is likely to create conditions conducive to accidents.

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Safety incidents drop when reliability improves. Why? Safety incidents occur when operators scramble to compensate for failed equipment or shut it down; while it is being cleared of working fluids and gasses, energy sources, etc., while the work is being done, and then while restoring equipment to normal after repairs.

As safety records improve, in addition to achieving safety goals and obvious human benefits, workers compensation premiums decrease as the operation becomes a safer place to work.

Environment – fines and compliance

Equipment in good condition runs as intended, consumes energy/fuel at economical rates, emits less pollutants, remaining within set emission limits, avoids spills, leaks and product losses, prevents contamination of the immediate environment, and possibly downstream environments (in the case of gasses and liquids). *For example, consider the recent tailings dam failures at mines in Brazil and British Columbia. Design and maintenance of the dams should take the operating context and environment into consideration – both dams failed to do so.*

Non-compliance with environmental regulations can result in fines and loss of license to operate. Avoiding these incidents saves whatever might be spent on fines, while keeping you operating and continuing to earn revenues.

Working Environment, Turnover and Retention

Would you rather work in a clean and bright environment where everything is in its place and easy to find, or in a chaotic, dark, mess?

For decades, the effects of lighting on worker productivity have been studied. The “Hawthorne Effect” refers to a phenomenon of productivity increasing when employers show an interest in their workers and the state of their workplaces.

Workers are happier in better work environments. Happier employees are less likely to leave, so turnover levels drop. *In a recent project with a major health care facility, we replaced damaged and dirty floor tiles, ceiling tiles, repainted walls where they were scuffed, made sure light fixtures were all working, cleared up clutter in hallways, mechanical and store rooms. The hospital management noticed an immediate change in workers’ demeanor and attitude towards their work. They seemed happier and more willing to do a better job. They had fewer complaints from clinical staff, from patients’ families and there was a sense that even patient care was improving. That all happened in just a few weeks-time by looking after what had been deferred maintenance.*

Lower turnover reduces the cost associated with finding and training replacement workers (especially if they are skilled trades persons), dealing with grievances, and other problems present in poor working environments. Replacing an experienced employee can be costly; 1.2 to 1.4 times their base salary. Retaining workers saves these costs.

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To be skilled enough to do their jobs well, proactive maintainers require periodic training to enhance their skills and motivation. Investing in training ensures the quality of maintenance, peak performance of physical assets, better employee morale and retention.

So how do we achieve these benefits?

Maintenance plays a big role in producing all of those benefits.. Good planning and scheduling delivers efficiency by getting maintenance work done. But what about effectiveness?

Exhaustive studies into equipment failures that led to commercial airplane crashes showed that many crashes were actually caused by maintenance doing the wrong work! That finding and others led to the creation of a new method for determining the right work called, “Reliability Centered Maintenance” (RCM). This method has proven hugely successful, not only for airlines, but elsewhere. Using the RCM method ensures that the right work is identified and done, at the right time. *For example, commercial airlines in the 1960’s used to crash at a rate of 6 per million take-offs. It may not sound like much today it would translate into about 1 crash every 2 days. Thanks to RCM that is now only about 1 every 2 months. It also reduced aircraft maintenance manhours by a factor of 3 times.*

Combining planning, scheduling, RCM and good work execution by a “right-skilled” workforce keeps assets operating within their built-in capabilities and leads to world class performance.

What happens to the maintenance budget?

Cost reductions and efficiencies all contribute to a reduction in the budget needed to deliver on asset reliability. The right people doing the right work at the right time with the right support eliminates a lot of waste. In the world of “lean” that is known as “maintenance reduction”.

Doing the right proactive, planned and scheduled work costs about 33% of the cost of unplanned, unscheduled reactive work. *For example, if 90% of your work is reactive at a cost 3X that of the 10% of work that is proactive and each % of proactive work has a fixed unit value of $1, then your total cost is:*

Reactive work (90 x $3) + proactive work (10 x $1) = $280.

By shifting work from reactive => proactive and from unplanned / unscheduled => planned / scheduled, a reasonable target is 25% reactive and 75% proactive. Your costs are then become:

Reactive work (25 x $3) + proactive work (75 x $1) = $150.

That reduces costs by $130 or over 46%. It might take a few years to achieve this outcome but this example will give you a sense of just how much money is wasted by the break-then-fix maintenance approach.

Conclusion

Maintenance can make a big contribution to a company's bottom line profits and overall financial health via cost reductions and / or revenue increases that improve margins. These improvements don't require capital outlays to achieve. In fact, they can defer and even reduce the need for replacement capital. The application of good maintenance goes beyond direct operational cost savings. It reduces the need for working capital, can lead to safer and more compliant operations that incur fewer fines and penalties, and safeguard the renewal of operating licenses. Producing consistently at higher rates not only satisfies performance goals and financial forecasts, it makes the company a better risk for lenders and insurers. Consistency in performance forecasts also positively impact stock prices.

These improvements lead to better financing terms for new capital, lower premiums on insurance policies and workers compensation programs. Because operations are more stable, the working environment also improves. Where better working conditions prevail, employee morale is elevated, which leads to greater retention and lower turnover costs.

Maintenance, often thought of as a "necessary evil", has impacts across the business. It is well worth investing in maintenance and its managers to focus on doing the right work at the right time in the right way.

Author:

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