REDUCING MANUFACTURING DOWNTIME:
Achieving up to a 400% ROI with Preventative Training

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(Down)Time is money

Simply speaking, downtime occurs when a manufacturing process stops for an unplanned event.[1] While this occurrence is frequently attributed to equipment failure, it can also arise due to material issues, unscheduled maintenance or a shortage of operators, among other contributors. Whatever the circumstance, the unifying element is that although production is scheduled, the process cannot run due to an unplanned stop.[1]

Downtime is disadvantageous to any manufacturing group—after all, if people or machines are idle, then products are not being made, which ultimately affects the business' bottom line.[2] This produces a negative domino-effect in which established processes are destabilized, workflow is disrupted and efficiency is greatly reduced.[3] The undesirable outcome is particularly significant in today's competitive manufacturing market, where production efficiency and effectiveness are major priorities.[4]

Ultimately, minimizing manufacturing downtime yields greater returns for a company[2] and is key to maintaining competitive vigor in this business landscape. To achieve these returns, companies are turning to methods aimed at analyzing their overall downtime in greater detail. These methods provide companies with comprehensive data which allows them to identify and quantify downtime costs and impacts, as well as track the return on investment (ROI) of these solutions.[5]

For many other manufacturers, this is not the case: it is estimated that approximately 80% of industrial facilities are unable to estimate their downtime accurately; furthermore, it is projected that many of these facilities are underestimating their True Downtime Costs (TDC) by 200 to 300%.[5]

This is significant, because by accounting for TDC and ROI for applicable solutions, plant managers avoid the risk of making poor decisions or neglecting important priorities.[6]

Counting the costs

For most manufacturers downtime is the single largest source of lost production time,[1] and because of the high visibility of equipment failures and breakdowns, this event receives a great deal of attention.[1] However, in spite of this transparency, as above mentioned, an overwhelming number of companies significantly underestimate their TDC.[1]

A closer look at TDC reveals that factors commonly overlooked, or previously considered "non-tangible," must be considered to arrive at a more accurate value.[7] As specific examples, wasted business support and opportunity costs due to the unforeseen allocation of resources used to rectify a downtime incident must also be accounted for.[6]

But perhaps most significant and appreciable, are the tangible costs of downtime incidents, including:

- The cost of labor rendered idle by the unavailability of machinery; for example: direct wages, overhead such as insurance, retirement, training and resources utilized by the labor.
- Overtime for maintenance personnel, communications and other resources to restore the system.
- Extra costs to start a machine (e.g., excessive power consumption during start-up).
- The cost of waste resulting from incomplete or "half-baked" products trapped during the "shut-down" period and the cost of spares.[8]

To appreciate the frequency and impact of these events, consider the following:

- Most manufacturing organizations today suffer with 30% or more downtime during their scheduled production time.[9]
- Almost every factory loses at least 5% of its productive capacity from downtime—many lose up to 20%.[5]
- In a survey of 101 manufacturing executives in the automotive industry, from parts suppliers to engine makers to automakers, a majority stated that the cost of stopped production cost an average $22,000 per minute or $1.3 million per hour of downtime—some survey respondents reported figures as high as $50,000 per minute.[3]
- In terms of hours of stoppage per year, the automotive industry takes the lead at approximately 661 hours of stoppage, followed by food, beverage and tobacco firms which average 442 hours and pharmaceutical companies at approximately 225 hours of stoppage.[10]

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With such high costs at stake, keeping production machinery operating smoothly is critical to a manufacturer's bottom line.[3]

Cost-control: If it ain't broke do fix it!

In the face of continuing cost-control efforts, the challenge for manufacturers has always been to produce high-quality goods while optimizing resources at every step of the production process.[11] Thus, plant managers, maintenance engineers and quality control professionals are consistently seeking ways to sustain quality standards while avoiding expensive unscheduled downtime or equipment failure.[11]

In recent years, an increasing number of sophisticated approaches have been developed to control the costs of labor and inventory for equipment maintenance and supply chain management, while ensuring quality control.[11] A primary focus of these initiatives has been to reduce unwanted work stoppages—to that end, total productive maintenance (TPM) and preventative maintenance (PM) programs have been heralded as effective solutions.[9]

TOTAL PRODUCTIVE MAINTENANCE

Over time, total productive maintenance has emerged as a clear best practice for reducing downtime.[12] This approach champions proactive and preventative maintenance to maximize the operational efficiency of equipment; therefore, strong emphasis is placed on empowering operators to maintain their equipment. As a result, distinctions between traditional roles of production and maintenance are essentially blurred.[12]

In this system, all stakeholders work together to help reduce breakdowns, restore or improve on intended efficiencies, while reducing and eventually eliminating quality defects.[14] This involvement of the entire workforce in the pursuit of common and necessary objectives has also been shown to increase employee morale and job satisfaction;[13] in addition, it is said to promote a safe working environment.[12]

TPM is a holistic approach to equipment maintenance that is designed to optimize the utilization, performance and productivity of a manufacturer's plant and equipment[14] with a modest investment in maintenance.[15]

TPM is a holistic approach to equipment maintenance that is designed to optimize the utilization, performance and productivity of a manufacturer's plant and equipment[14] with a modest investment in maintenance.[15] The overarching goal is the total elimination of all losses, including breakdowns, equipment setup and adjustment losses, idling and minor stoppages, reduced speed, defects and rework, spills and process upset conditions, and startup and yield losses. This leads to improved utilization of production assets and plant capacity.[16]

When TPM methods have been effectively implemented, the following benefits have been seen:

- A 400% ROI
- Plant capacity increases of more than 10%[17]
- Increases in a machine's capacity by 25%–60%
- Productivity improvement of 50%[18]
- Quality defect improvement of 25–50%[18]
- Reduction in maintenance costs by 10%–50%[18]

PREVENTATIVE MAINTENANCE

Similarly, preventive maintenance is a schedule of planned maintenance actions aimed at the prevention of breakdowns and failures.[19] Like TPM, its primary goal is to prevent the failure of equipment before it actually occurs.[19]

With this technique, an emphasis on the preservation and enhancement of equipment reliability is key, so replacing worn components before they fail is critical.[19] PM programs reduce downtime and promote cost-savings through: better conservation and increased life expectancy of assets, reduced overtime costs and more economical use of maintenance workers, reduced cost of repairs and improved safety and quality conditions.[20]

Along with these advantages, manufacturers can enjoy some long-term benefits including, improved system reliability and more efficient inventory management.[21]

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Overall, PM generates a solid rate of return in terms of risk mitigation and asset protection. Returns vary from industry to industry; however, the ROI can be as high as 500% or more. Anecdotal evidence also demonstrates the value in PM programs:

- A facility's uptime improved by over 30% in one year using this technique.[23] Another reported increases in the "mean time between failures" (MTBF).[24]
- An analysis of fleet vehicles participating in a PM program reported roughly 20% fewer days down per service repair in comparison to those not in a PM program.[25]

- In another facility, unplanned downtime was reduced by 18 hours per month by allocating $508 towards preventive maintenance labor and materials; this resulted in cost savings of $115,536.50 per month and an additional $53,280 in production output per month.[21]
- An automobile manufacturer reported that the establishment of a PM program in their 16 assembly plants reduced downtime from 300 hours per year to 25 hours per year.[19]

With results like this, it is evident that no well-managed plant can afford to operate without an effective PM program in place.[19]

In tough economic times and in an era of maintenance skills shortages, preventive maintenance makes sound business sense.[21] Organizations that ignore the advantages and profitability of this technique will continue to struggle and/or miss their true potential in the marketplace.[21]

Reaping the benefits

Although TPM and PM have been recognized as effective in reducing downtime, some companies fail to realize the importance of investing the time and resources in creating such programs.[26] Implementing these initiatives is a substantial task that involves high levels of executive support.[1] Integral to this support, is specialized education and training. In truth, training should be a standard part of these programs[29] in order to systematically provide awareness, improve skill levels and enhance maintenance technical aptitude for all employees.[28]

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Education, training and investments in people characterize all aspects of lean principles.[32] In the maintenance area, they are even more important because of the specialized knowledge required for manufacturing equipment.[29]

For TPM in particular, training and education has been identified as a critical pillar, as it ensures that staff are trained in the skills identified as essential both for their personal development and for the successful deployment of the technique.

Recognizing this, leading companies have responded to accelerating growth and skill requirements by establishing education and training systems designed to maximize the potential of every employee.[30] Fundamentally, improving the abilities of individuals not only helps the company's bottom-line, but also increases employees' pride in their work.[33]

In the case of downtime, research has shown that clear communication between managers and employees is crucial in terms of boosting efficiency.[31] For instance, if a supervisor explains the relationship between downtime and business profits, then employees feel part of the team, included in decisions and useful—all of which are key to increasing productivity.[32] Furthermore, employees may have insight into limiting downtime, increasing morale, producing more goods and knowledge of better service equipment and tactics.[32]

With employees properly trained and involved in total productive maintenance and preventive maintenance principles, "productivity has been proven to increase, while downtime is minimized.[31]

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[1]http://www.vorne.com/solutions/reduce-down-time-in-manufacturing.htm

[2]http://www.manufacturing.net/articles/2013/01/five-ways-to-minimize-manufacturing-downtime

[3]http://news.thomasnet.com/companystory/downtime-costs-auto-industry-22k-minute-survey-481017

[4]http://www.diva-portal.org/smash/get/diva2:757534/FULLTEXT01.pdf

[5]http://www.strategiccompanies.com/pdfs/Assessing%20the%20Financial%20Impact%20of%20Downtime.pdf

[6]https://www.isa.org/standards-and-publications/isa-publications/intech-magazine/2006/January/channel-chat-when-true-cost-of-downtime-is-unknown-bad-decisions-ensue/#sthash.t7liRJNg.dpuf

[7]https://bin95.com/True_Down_time_Cost_2sample.pdf

[8]http://www.brighthubpm.com/monitoring-projects/117725-how-does-downtime-influence-manufacturing-efficiency/#sthash.Mdnjdllx.dpuf

[9]http://www.leanteamsusa.com/total-productive-maintenance-tpm-total-is-the-key-point/

[10]http://www.pharmamanufacturing.com/articles/2004/115/

[11]http://tolerro.com/site-content/Whitepaper-Predictive-maintenance-for-Manufacturing.pdf

[12]http://www.leanproduction.com/tpm.html

[13]http://www.plant-maintenance.com/articles/tpm_intro.shtml

[14]http://www.theleangroup.co.uk/total-productive-maintenance_c124.aspx

[15]http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2246601

[16]http://www.epa.gov/lean/environment/methods/tpm.htm

[17]http://www.maintenancetechnology.com/2000/04/prescription-for-total-tpm-success/

[18]http://www.wmep.org/wp-content/uploads/2015/01/TPMInfoSheetND.pdf

[19]https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CEoQFjACahUKEwi6h_v9t-rHAhUE04AKHaeuAgA&url=http%3A%2F%2Fwww.freequality.org%2Fdocuments%2FTraining%2FPreventive%2520Maintenance.ppt&usg=AFQjCNGrHs9AkcEpinjOAI1M4kd07Ug_eA

[20]https://www.swspitcrew.com/articles/Do%20We%20Need%20PM%200411.pdf

[21]http://reliawiki.org/index.php/Introduction_to_Repairable_Systems#Preventive_Maintenance_2

[22]http://pmmi.files.cms-plus.com/MS/certified/newsletters/PreventiveMaintenance.pdf

[23]http://www.reliableplant.com/Read/28388/maintenance-reliability-roi

[24]http://www.thermflo.com/attachments/article/2/Power%20of%20Preventive%20Maintenance.pdf

[25]http://www.automotive-fleet.com/news/story/2013/07/phh-study-finds-preventive-maintenance-programs-reduce-downtime.aspx

[26]http://www.perfectproduction.com/down-time-tips.htm

[27]http://eagletechnologies.com/the-importance-of-preventive-maintenance-training/#sthash.Cq9hyMGH.dpuf

[28]https://www.moresteam.com/lean/tpm.cfm

[29]http://www.strategosinc.com/tpm_pillars_4.htm

[30]https://books.google.com/books?id=yFP5DCKG4MEC&pg=PA262&lpg=PA262&dq=EDUCATION+AND+TRAINING+IN+TPM&source=bl&ots=KTNDxl4I7Q&sig=L-2jFBGimD3sI6KB2Exs3UgcYHk&hl=en&sa=X&ved=0CCsQ6AEwAmoVChMItci-zcnrxwIVQqKACh0O-wL2#v=onepage&q=EDUCATION%20AND%20TRAINING%20IN%20TPM&f=false

[31]http://www.manufacturing.net/articles/2013/01/five-ways-to-minimize-manufacturing-downtime

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