

Lean Maintenance

Best Practices to Turn Asset Management
Into a Profit-Center



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Introduction

“In an effort to view maintenance as a positive activity, it is important to see it as a profit center instead of a cost center. A cost-center approach is strictly concerned with adhering to the budget and decreasing expenses as much as possible. In contrast, the profit-center model realizes that investment and operating costs can be allocated to improve efficiency. This increased efficiency naturally results in higher profits.”

One of the most popular buzz-words in business today is “lean.” This term conveys the idea of fat elimination – the elimination of enterprise waste, the streamlining of processes to increase productivity, and the more efficient use of capital assets and valued personnel in the pursuit of continuously improving bottom lines. There is, of course, nothing new in this concept. More than 200 years ago, Benjamin Franklin urged the reduction of waste in government, industry, and even private lifestyles. Dr. W. Edwards Deming brought the power of numbers to “leanness” with his statistical process control innovations and his 14 principles for management improvement. Shigeo Shingo revamped Demings’ ideas to provide the Toyota Method of manufacturing – a substantial step toward refined leanness. Dr. James Womack, founder of the Lean Enterprise Institute, further refined leanness in his books *The Machine That Changed the World* (Macmillan/Rawson Associates, 1990), *Lean Thinking* (Simon & Schuster, 1996), *Seeing The Whole: mapping the extended value stream* (Lean Enterprise Institute, 2001), *Lean Solutions* (Simon & Schuster, 2005).

From Franklin through Womack to today’s business environment, the idea of leanness has been applied to a greater or lesser degree to all business processes. However, when one reads most of the literature available on lean business practices, the material woefully neglects the maintenance processes that are relied upon to keep companies and enterprises running consistently, reliably, and profitably. This is not to say that the above giants of leanness ignore maintenance. Nonetheless, the bulk of leanness authors group maintenance in a bundle with “other processes” and rarely offer tools specifically addressing lean methodologies with respect to the maintenance effort. This lesser valuation of the maintenance process is mirrored by the view of maintenance held by corporate management in general. It is common knowledge that asset downtime disrupts production and drives up both process and per unit operating costs. Executives often lose sight of this because they focus on output, not on the assets used to create it. As one CFO put it, “Companies care about how many widgets they make, not the widget machine.” The irony is that companies can use asset performance management in implementing lean maintenance techniques not only to make more widgets, but to make each widget more profitably.

This paper provides concrete suggestions and identifies specific areas within the maintenance process where companies and enterprises can reduce waste, increase reliability, and view the maintenance effort as an integral part of a lean business posture.

Lean Maintenance: Factors for Success

“The genius of lean manufacturing is its simplicity. The doctrine appears to preach the obvious: Limit waste, keep a clean work space and encourage employees to seek efficiencies. The challenge of lean is its totality. The concept asks companies to cut waste across the production process, from material ordering to packing and shipping as well as throughout every department, from human resources to sales.”

Totality. When one discusses ways to improve maintenance practices, inevitably the discussion splits into compartmentalized topics. Parts inventory, preventive maintenance scheduling, trade and skill management, tool costs, breakdown management, and the like tend to dominate small parcels of the discussion. Womack, Shingo, Deming, and their compatriots would cringe at such siloed conversation because the heart and soul of contemporary lean management – in maintenance or any other endeavor – is indeed the totality of the coverage. Top-down, bottom-up, sideways – the maintenance process requires much more than a single approach. An energetic, effective enterprise recognizes the connectivity of issues that affect maintenance efficiency and ultimate success and include a broad spectrum of solutions. In addition, effective leanness in maintenance – like all other areas of the enterprise – requires continuous review, evaluation, and improvement. Because a static maintenance process is a maintenance process that is gathering new forms of waste and inefficiency.

Finding Maintenance Success Factors: The Gathering of Ideas

When attempting to accomplish the goal of “getting lean” in the maintenance arena, a company must gather all stakeholders together and open up an evaluation process that covers all aspects of maintenance. This includes bringing in the customers of the maintenance process – the assemblers, parts storeroom managers, shipping foremen, and even product designers and engineers. This is because each of these groups of persons sees a different aspect of the maintenance picture (or should see an aspect!).

This may sound like a gathering of hundreds. Not quite. Meetings of affected personnel should remain of manageable size while still gathering pertinent input. Discussion should be open and controlled – managed by a flexible moderator well versed in all aspects of the group. The general agenda for the discussions should be published well in advance so that participants come prepared rather than simply showing up for a free-for-all chat session. White boards and flip charts are musts – so that ideas can be recorded in clear view of participants. The overriding aim is to identify problems and suggest solutions.

Mary Jo Feldstein, Lean and Mean, St. Louis Post-Dispatch [MO] April 16, 2004.

Note that upper management participation is required. Deming, Shingo, Womack, and contemporary authorities on enterprise process improvement agree that without upper management buy-in, the effort of organizing for leanness is doomed to fail. In fact, Deming and Womack go so far as to identify management as the number one barrier to successful process revision. Too often management lives in its own world – the world of quarterly performance, quick-fix, and top-down directive that is not supported by an intimate knowledge of the in-the-trenches processes upon which they depend. This isolates management from the core of the business – and that is a recipe for failure. A recent Aberdeen Group survey found that more than 70% of survey respondents report that their maintenance departments function on a stand-alone basis. At the same time, 87% of respondents report that asset maintenance is very or extremely important to their organizations overall financial performance, but only 7% are completely satisfied with their maintenance performance. Without energetic management participation in the “leaning” of maintenance processes, improving the maintenance process becomes an up-hill battle.

Needless to say, successful meetings reveal weaknesses in processes. The most successful meetings also find viable remedies for weaknesses – and find ways of improving numerous processes whether they were identified as “weaknesses” or not. With the full support of all levels of management, the results of these meetings can be organized into an overarching improvement plan and published to all stakeholders. In addition to setting directions, such publication provides invaluable feedback to participants – recognizing and reinforcing their valuable contributions to the improvement process. Often this is the difference between blind following of orders and the flexible, alert, agile commitment to a team-oriented goal.

Areas Most Affected By Lean Maintenance Efforts

Realize that there is no concrete list of improvements that can be provided in the blind to revamp a typical business. That is because there is no such thing as a typical business. Each enterprise has its own superlatives and laggards. Specific areas within the maintenance arena do, however, lend themselves to generally similar examination.

- **Spare Parts Inventory Management:** Most parts storerooms contain a substantial number of excess or obsolete parts. Often these parts add up to a 6- or 7-figure investment that languishes within the maintenance budget. An enterprise must optimize its parts inventory so that parts are available for preventive and corrective maintenance without gathering dust worthlessly on shelves and in storage areas. Such optimization requires communications between storeroom managers, purchasers, and maintenance personnel (foremen and technicians). Discussions center on parts usage, maintenance routines, anticipated demands, and historical usage data. In a multi-site enterprise, the discussion must include options to centralize expensive, critical, and seldom-used items. Although this is a parts issue, stakeholders must be open to suggestions for altering maintenance operations scheduling to permit more control and less waste in the parts inventory management regimen.

- **Preventive Maintenance Management:** A quality preventive maintenance program is the cornerstone of a quality maintenance program. For ages the benchmark budget has been 90% for PM activities and 10% for corrective/breakdown maintenance. Anything less indicates urgent need for improvement – because larger spending on corrective maintenance also means greater number of unplanned equipment shutdown, greater equipment wear, and lessened equipment useful life. In today's stringently competitive business world, preventive maintenance must be further refined. Examine predictive maintenance, reliability-centered maintenance, and risk-based inspection management to tailor PM activities for critical assets. Use historical maintenance and breakdown data to facilitate this important tailoring.
- **Cross-Training Personnel:** Earlier we emphasized that lean maintenance is a totality. This means that maintenance personnel must become more flexible in their skills. This does not mean a plumber must qualify as an electrician. It does mean that the plumber should become well versed in plumbing systems and potential associated problems in his/her areas of responsibility. The plumber learns about important switchboards, conduits, and power supplies; the electrician learns about important valves, piping, pumps, and reservoirs. The result: a much more savvy workforce that is more prepared to recognize potential problems before those problems impact operations.
- **Continuous Improvement Throughout the Maintenance Spectrum:** Once lean methodology is initiated, all stakeholders must buy-in and contribute not just at the outset, when progress can be most visible, but as a part of daily routines. That is why cross-training personnel can provide the impetus for continued reduction in wasted time, effort, material, and production capacity. Each member of the maintenance team must be encouraged and empowered to initiate improvements. All such initiatives should be recorded and tracked to quantify true improvements and to ensure that the initiatives continue to match the overall goals of the maintenance program – and the goals of the business. Continued upper-level management support and involvement is critical if only to apply on-going push toward greater successes in the leanness effort. It is all too easy for an organization to slip into complacency and allow the successes of leanness to be lost in the fog of routine. Dr. Womack uses Lucas PLC, a British supplier of mechanical and electrical components to the automotive and aerospace industries, as an example of how a highly successful and once-lean enterprise can return to wasteful practices because of loosening leanness commitment over time. It took Lucas a period of seven years to slip away from lean practices. The message here: Never relax in the effort to trim waste and streamline practices.

Hand-in-hand with these improvements comes refined purchasing methodology. Most storerooms employ computerized systems that govern parts ordering. Consider supplier consolidation within that scheme so that the power of volume purchasing can be brought to bear on supplier pricing. For multi-site enterprises this can reap large rewards in the form of cost savings, better supplier service, and lower inventory holdings.

In addition, facilitate much greater communication between line maintenance personnel and PM planners and managers. Why? To generate a flexible preventive maintenance program that is prepared to use any opportunity to accomplish PM activities that may be coming due. Such opportunities include equipment breakdowns and equipment changeovers. By taking advantage of an unplanned shutdown, PM managers can save a planned shutdown, thus improving overall productivity. PM activities should be scheduled to coincide with equipment changeovers and other planned shutdowns when possible.

The Role of Technology

“The lean model stresses an evolutionary process of change and adaptation, not an idealized technology-driven end state.” Defense Acquisition University

Lean maintenance is not the same thing as the acquisition of more and more technology. That is a conceptual error committed by far too many businesses in making huge investments in new equipment, software, and hardware, believing that they are solving problems by such purchases. Such a path is, of course, counterproductive to the lean model.

That having been said, we must now stress that technology does have a role in the progress toward greater leanness in the maintenance process. Recall grains of thought embedded in the above factors affected by lean maintenance efforts. In each case we call for the gathering of and analysis of data to support lean activities. Tracking parts usage and cost trends, automated/tailored parts purchasing, recording and evaluating effectiveness of preventive maintenance and the associated trends in breakdown occurrence, the recording of personnel cross-training results, and especially the on-going tracking of lean efforts to document progress, identify additional areas for improvement, and to police past efforts to ensure no back-sliding.

Where does technology belong in this scheme? Nearly all successful business enterprises employ enterprise asset management (EAM) software applications. Primarily these applications manage work assignment through various methods. Quality EAM offerings provide integration between the maintenance effort and spare parts inventory management. Excellent offerings include a variety of data requirements associated with maintenance activities so that each activity provides building-block information that leads to trend and event analysis. And the very best EAM products integrate storeroom, repair, preventive maintenance planning, and purchasing functions with numerous additional lean-oriented technologies such as mobile connectivity, bar code technology, radio frequency identification (RFID) technology, and automated communications features such as email, pager, and operating screen notifications to key personnel. The inclusion of key performance measurements is a must to ensure that leanness goals are being accomplished. Businesses should also look for a separate analytical capability that is incorporated within the EAM umbrella. Clearly these capabilities contribute both to the streamlining of the maintenance work process and to the gathering of critical performance, cost, and productivity information. A business should seek technology only as it contributes to these corporate goals.

James P. Womack and Daniel T. Jones, From Lean Production to the Lean Enterprise, Harvard Business Review, March-April 1994.

Tom Shields, “What is Lean,” TEACHING NOTE, Senior Research Associate, Massachusetts Institute of Technology, January 1999.

Conclusion

Lean maintenance is mostly about people, their functions, and their contributions to the business processes that make up the associated enterprise. In this paradigm, the role of upper management is, therefore, crucial to the success of the leanness effort. Without energetic, agile, flexible, insightful leadership, the lean maintenance effort will struggle – or fail. Everyone in the business concern is a stakeholder. And every stakeholder needs to be empowered to accomplish leanness maintenance goals. Those goals, of course, must be aligned to the goals of the enterprise itself.

About Infor

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