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jun 2006
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What It Will Take To Change the Future of U.S. Manufacturing

Regaining America's Manufacturing Competitiveness Through Maintenance

The Issues

by Christopher J. Meyers

For decades, America has been battling the threat of cheaper and faster manufacturing from foreign competitors and we are losing. Whether from cheaper labor costs in places like Mexico, China and even Viet Nam, or from more efficient production techniques used in countries like Japan and Korea, the fact is America's manufacturing base is eroding. Three million manufacturing jobs have been lost in just the last four years alone and the current level of manufacturing employment in the U.S. is at its lowest level in over 50 years. Throughout this struggle, we have focused our competitive efforts on improving production processes and lowering costs by utilizing the latest techniques, consulting fads and business school buzz words of the moment, yet we still find ourselves at risk. Given all our efforts and progress, we have never truly addressed the area of maintenance despite its dramatic effect on costs, throughput and quality.

American industry has instituted Just In Time (JIT) to lower inventory costs, Total Quality Management (TQM) to improve quality, Six Sigma and Lean Manufacturing to help increase productivity, while virtually ignoring maintenance and reliability. This is an amazing oversight given the fact that American companies spend nearly $2 trillion a year on maintenance (half of which is held up in inventories). If we applied the same effort and metrics to increasing turns and reducing the levels of our maintenance, repair and operation (MRO) inventories that we have to improving production inventories, billions could be driven to the bottom line. The other half of that $2 trillion lies predominately in labor where, in the majority of maintenance organizations, maintenance craftsmen spend as little as 2 hours per day doing actual hands-on work activities. Mix in a lack of fundamentally sound maintenance processes and technologies across most manufacturers and the opportunity grows exponentially. Only one-third of all organizations have some type of work-order system and only about one-third of those, or 10% of all organizations, actually track such work-orders to best manage their time, activities and inventories. If we include the impact proper preventative maintenance has on throughput and quality, it is clear that we are missing an opportunity to drastically improve our competitive position, and, ultimately, our bottom line.

There are certain economic realities associated with manufacturing in America. Our standard of living is relatively high, which continually pressures our already high and fairly immovable wages. Health care costs are an ever increasing burden for employers and our corporate social responsibilities only continue to grow. While our government must delicately balance the needs of our workers with the reality of a competitive world market, it is ultimately our ability as a nation, and as manufacturers, to be competitive within this system that will determine our manufacturing position going forward. And while we have exhausted ourselves from the shop room floor to the executive suite in pursuit of becoming a leaner, more efficient, cost effective producer of quality goods, we have left virtually untouched, under researched and under utilized the entire area of maintenance and reliability. By way of example, while attending a well known and respected business school in Boston, MA, I was required to take a class on manufacturing. The class was given a "must read for all executives in manufacturing" that contained 389 pages of the most progressive thinking around manufacturing. In that entire text, there was exactly one full sentence dedicated to maintenance.

Unless we can convince our executives, the professors within our foremost academic institutions and our leaders of the future to embrace, research, teach and exploit the importance and benefits that lie within maintenance, we will not, as a nation, take full advantage of one of the last tools we have left to be truly competitive in the world market.

So...where do we go from here?

Regaining America's Manufacturing Competitiveness Through Maintenance

The Solutions

by Terry Wireman

As discussed previously, American companies continue to take a cost focus on maintenance and reliability. This leads to a focus on the incurred maintenance and reliability costs and a lack of understanding of the impact costs of maintenance and reliability. The incurred-cost approach to maintenance also leads to sub optimization of the asset base. For example in a study by MIT professor Erik Brynjolfsson (http://ebusiness.mit.edu/erik) it was estimated that there are trillions of dollars in underutilized manufacturing capacity in the United States. Why would companies move operations offshore for cheap labor when they are not properly utilizing the hard assets in which their shareholders have already invested? Is it possible that they do not understand the value of their assets, let alone how to optimize their utilization? Does the impact of cheap labor really compare to the value of optimized asset utilization?

If America is to regain competitiveness though improved asset utilization, where do we begin? The answer has many facets that must be addressed; however, it begins with improving the maintenance and reliability functions which impact the asset utilization. The four main facets of maintenance and reliability improvement are:

1. Designing the Maintenance function
2. Utilization of a Maintenance Information System
3. Providing Maintenance and Reliability Education for the Organization
4. Evolving an Asset Centric Business Process

Let's take a close look at each facet individually:

Designing the Maintenance Function

This facet focuses on designing the maintenance function to meet the needs of the organization. This highlights the need for the maintenance organization to have a vision and mission statement. If there are no clear objectives for the maintenance business, then the organization will never be designed in an efficient and effective structure. In order to properly design the maintenance organization, the following are required:

A. Define the vision, mission, goals, and objectives for the maintenance organization

B. Determine the geographic structure for the maintenance organization

C. Determine the reporting structure for the maintenance organization

D. Determine the roles and responsibilities for the maintenance organization

E. Determine the staffing levels for the maintenance organization

F. Determine the performance indicators for the maintenance organization

Utilization of a Maintenance Information System

Once the maintenance business is correctly configured, an appropriate information system should be implemented to properly manage the business. This system is usually referred to as a Computerized Maintenance Management System (CMMS) or an Enterprise Asset Management (EAM) System. This system is utilized to collect all of the maintenance information (such as labor, material, contract cost and history). This information is typically collected against a piece of equipment, a building-floor-room locator, or a functional location. As the information is collected over time, it builds a historical database that allows for proper analysis of the maintenance business function. However, few organizations properly utilize their CMMS/ EAM


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systems. This results in incomplete or inaccurate financial and technical data. This lack of data prevents most companies from being successful with the third step.

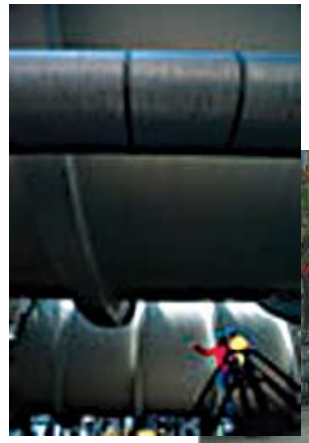
Providing Maintenance and Reliability Education for the Organization

It is at this stage that most organizations fail, which results in manufacturing finding itself in the conditions described in the first part of the article. Most business managers have little or no exposure to the maintenance business, so it receives little attention, except when it comes time to reduce expenses. However a competent business oriented maintenance manager can utilize the data that is being collected over time to show manufacturing executives the direct impact the maintenance business has on their profitability. Since the information is being collected in the company's CMMS or EAM system, they have the data to show the direct impact. In addition, the historical case study information to show how other companies have realized these benefits is readily available. As clearly seen from part 1 one this article, this education is not occurring for most senior executives today.

Evolving an Asset Centric Business Process

This process is truly an evolution. It occurs only in companies with a clear vision of how their assets are utilized to produce their products. In addition, the company must also have a clear understanding of the technical aspects of their assets to optimize their financial investment in the assets. This requires a holistic view of the assets, from the time they are designed to the time they are decommissioned. True optimization of the assets only occurs when all departments involved in the asset life cycle focus on asset optimization.

The importance of this approach is highlighted in dozens of publications, including textbooks published by Seiichi Nakajima and Benjamin Blanchard. Particularly in the Introduction to *TPM*, Nakajima states that 95% of the life cycle costs are determined in the design phase of an asset's life cycle. Yet, 75% of the total life cycle costs are incurred in the operational and maintenance phase. If the design engineers do not communicate with the maintenance and operational personnel, how can the economic investment be optimized? In fact, if all departments involved in the life of the asset are not involved in making decisions about the assets, the life cycle costs are not optimized and the company's ability to compete is severely impaired.



If organizations cannot progress to a high level of maintenance and reliability maturity across their organizations, they will never be competitive. The majority of companies today are focusing on maintenance and reliability as a cost instead of a competitive weapon. This leads to moving entire factories to other countries due to cheap labor. If they continue to take a cost focus on maintenance and reliability, America will never realize the ultimate benefits from asset utilization. This will lead to a continual cycle of moving plant operations to countries with the lowest labor costs. This defocusing of resources will lead to the ultimate loss of American manufacturing.

Christopher J. Meyers is a Partner in Vesta Partners, and leads Operations and Corporate Business Development for the company. He has over 16 years of experience in private equity and corporate business development and has been involved in over $2 billion of investment activity. Prior to joining Vesta, he was with Spinnaker Venture Partners and Carlyle Venture Partners where he invested in early stage technology companies. Prior to that he spent 8 Years with GE Capital Services where he focused on Strategic Planning and Business Development successfully completing corporate acquisitions world-wide. He has a BA from Ohio Wesleyan University and received his M.B.A., with distinction, from Harvard Business School.

Terry Wireman is Vice President and a member of the Vesta Advisory Board. For over two decades, he has been specializing in the improvement of maintenance management and reliability. Mr. Wireman helps customers develop "World Class" maintenance and reliability policies and practices. As an international expert in maintenance management, he has assisted hundreds of clients in North America, Europe, and the Pacific Rim to improve their maintenance effectiveness. In addition, he has authored twelve books and numerous white papers and articles related to maintenance management process and technology.