

Between TPM and “Adjustable Wrench Maintenance”.

The realities of maintenance resource management.

By Antonio Reis.

Antonio Reis has been involved in both equipment design and industrial maintenance for more than 20 years. Antonio Reis has provided maintenance services and personnel training to various types of industries such as Metallurgical, Meat Packing, Food & Beverage, Petrochemical, Automotive, Converting and Semiconductor.

130 Billion dollars were spent on machinery and equipment by 364,000 manufacturing companies in the US for the Year 2000. Among those manufacturing companies about 65% had less than 20 employees. Only about 5,000 had more than 500 employees.

When we speak about maintenance training, cross craft skills, reliability centered maintenance, CMMS, benchmarking, maintenance awards etc, we must be talking about a sizable maintenance workforce. A workforce of maintenance workers with dedicated management, a planned budget and a set of objectives aligned with the company goals.

In view of that there are 235,000 manufacturing companies that will question the importance of TPM (Total Quality Maintenance) in their daily operations not because TPM is a bad philosophy but because implementation of such system would most certainly deplete the companies resources. TPM requires the commitment of all personnel to the optimization of equipment effectiveness. In an effort to reach TPM goals of zero breakdowns, zero adjustments, zero defects, zero accidents, zero short stops, etc, a company needs employees with capabilities and knowledge in different fields as well as the appropriate environmental factors impacting health and safety.

In my opinion manufacturing companies with small maintenance organizations need to adapt customized approaches to their equipment maintenance.

Most of the maintenance crews servicing equipment for small enterprises have less than five workers. Most of these workers have substantial mechanical aptitude but not enough knowledge to troubleshoot and repair to the component level. This also applies to those with an electrical background. In general these workers are not very good troubleshooters and end up either replacing perfectly good parts or missing the diagnostic allowing the equipment to fail. More, the defective assemblies are mostly repaired outside of the organization placing the majority of the maintenance costs to outsourced maintenance organizations.

In some industries such as the food industry the general knowledge of the floor workers with respect to equipment repair is very poor. Effective involvement of those workers in the effectiveness of the equipment from a reliability perspective will require a large effort that most manufacturers can't afford and that in part the said workforce is not willing to participate. A fifty years old worker picking black cauliflower from a conveyor does not want to invest time and effort in learning how to adjust the conveyor tracking unless the worker is paid for.

To effectively communicate, the majority of these workers need to learn the very basic of maintenance. Why would an employer spend countless hours in teaching and evaluating the workforce in maintenance subjects when the financial impact would be minimum? This occurs in many industries. In a machine shop the mechanic/machinist have little knowledge of motor controls; in a bottling company the electronics tech lacks knowledge in machine vision and data acquisition; in a dairy products manufacturer the mechanics have limited knowledge of PLC's; in a foundry the mechanic lack knowledge in automation controls etc.

These are because the work force is hired to satisfy the most important needs in the factory and even so motor control is essential in a CNC mill, it's rate of failure is low and does not justify dedicated maintenance.

The following are trends that I observed in small manufacturing companies:

- Management of small manufacturing enterprises is mostly knowledgeable on manufacturing issues with the product (processes) and has little knowledge about equipment details.
- Qualified maintenance personnel with enough cross craft training to effectively maintain all different equipment in a manufacturing enterprise is difficult to recruit and have a pay scale.
- Current manufacturing equipment and machinery have a level of reliability such that it is difficult to justify dedicated personnel to the maintenance function.
- Studies have proven that the operators or poor maintenance induces the majority of the equipment failures in manufacturing. With this it is easy to justify resources towards service quality and operator training instead of maintenance.
- At least in the beginning, the maintenance function requirements are satisfied by the equipment manufacturers. The equipment mfg companies have developed substantial processes to support their products. As marketing tools, these "value added" services often are part of the initial purchase agreement.
- For the most part good equipment mfg performs adequate service (time and quality wise) to their products and provide some sort of guaranty that in-house maintenance personnel can't. In some instances, preventive maintenance functions can be outsourced with success.

Studies have found that maintenance operations perform below 50% efficiency. If you consider that outsourced services can be paid based on performance and if those services are of quality and meet the manufacturing schedules, than small manufacturing companies have little if any incentive to adhere to TPM philosophy.

A small manufacturing company will do better relying on outsourced maintenance services than attempting to create an in-house competent technical maintenance team. Such arrangement requires one or two workers with enough knowledge to sustain the manufacturing and attend to short stops and adjustments and an interactive process with a provider of maintenance services that will proactively manage the maintenance function with minimum use of the company's resources. Services must be centered on reliability have a set pre-determined response time for breakdowns and include equipment inspections, maintenance planning, lubrication and repairs etc.

In a way, by outsourcing maintenance, a manufacturing company uses the resources as if operating under the “Adjustable Wrench” philosophy and has results more in line to those given with TPM. If properly structured, such practice it is not much different from that of centralized maintenance in large organizations. A large organization has a technical maintenance team that services the various manufacturing cells of the plant. In outsourced maintenance a maintenance provider serves different small manufacturing plants. Assembly repairs are done either on-site or at the provider’s facilities and returned to the plant. The spare parts can be stocked on-site or at the provider’s facilities.

There are issues with this approach in regard to proprietary information and trade secrets. Also processes to oversee expenditures in real time and track a maintenance budget need to be implemented. However with careful planning and the proper relationship you can insure the profitable management of your equipment reliability, and help keep your manufacturing plant competitive in the fast paced world of manufacturing.

A few basic steps should be taken by any manufacturing company to increase the effectiveness of outsourced maintenance:

- Management needs to evaluate the present condition of the equipment and determine if that condition meets the manufacturing needs. An outsourced maintenance organization specialized in your type of equipment can better rehabilitate the equipment with less effort and better quality than your limited workforce. This can be done over a set period of time and within the constraints of a budget.
- Management needs to evaluate the robustness of the process and the knowledge of the operating personnel to minimize operator-induced breakdowns and take measures to implement training to improve adjustments and short stops.
- In manufacturing processes where machine tool and process parameters changes are required often, management needs to implement procedures and the necessary discipline as to operate in a predictable manner.
- The operating standards need to provide for a predictable product output in terms of volume and quality.
- Management needs to recognize the leadership capabilities and attributes of the entire managing staff and create the ability to respond to the customer needs within the given schedules and product quality.

Every manufacturing plant operates under a resources limited maintenance. The important repair to perform is not the one that occurred first or is first in the queue but the one that has the biggest impact in the company profitability.

Please send your comments to reis@vitrom.com

[MAIN PAGE](#)

[TOP](#)