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RETURN ON MAINTENANCE

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Return on Maintenance

How to control maintenance costs without reducing maintenance efficacy.

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A COMBINATION of preventative and reactive maintenance is a common approach used by many manufacturing plants to maintain their equipment and facilities. They follow the recommended preventative maintenance protocol and they "fix it when it breaks" regardless of cost to avoid downtime. Economic considerations are usually not incorporated into maintenance programs, which are mostly focused on keeping the equipment running. Companies can increase their return on maintenance investment by implementing some simple yet effective strategies involving cost analysis and control, taking measures to improve how the maintenance work is performed and identifying the source of excessive equipment maintenance costs.

Cost analysis and control

All maintenance-related costs must be well documented and monitored. This can be achieved using computerized maintenance management systems (CMMS) that include dedicated analysis and control spending tools. However, understanding how costs are being tracked by the specific CMMS used is critical. Typically, standard maintenance and routine costs are entered into the CMMS but the non-standard costs are not. For example, the cost of custom work on specific manufacturing equipment performed by an external contractor is only documented in the company's purchasing or accounting program because the contractor payment is generated from that program. Therefore, some non-standard expenses related to specific equipment may not be recorded in the CMMS and would not be accounted for in the cost analyses for that equipment. The best solution would be to interface the CMMS with the accounting/financial program, however this is often cost prohibitive. A practical and less costly solution is to utilize an "additional cost" field in the CMMS where non-standard expenses such as the cost of an external contractor can be recorded and therefore included in the overall cost analysis and control. An "additional cost" field for tracking unusual costs that do not happen regularly may be included in some software programs but not in others. If it is not included in the initial configuration, it should be added as additional cost field, or when this option is not possible, as with certain CMMS, it can be added and tracked through custom reports.

In addition to integrating non-standard costs into the CMMS, standard costs should also be fully accounted for. For example, hourly wage rates for maintenance employees need to be incorporated into the cost of maintaining equipment. A common reason for not doing so is to avoid the possibility that this information may be accessible by other employees who utilize the CMMS. Maintenance managers who understand the need to include the wage component for a reliable cost assessment often resort to alternatives such an approximate cost based on average rate. This approach often leads to cost underestimation when the work is performed by senior maintenance employees, or the work is performed during overtime. The only way to accurately track the cost of work performed is to account for the true hourly cost of the maintenance employees including hourly rate, benefits and overtime.

Another important maintenance cost component is the inventory cost. A well-balanced and optimized inventory management plan such as Total Productive Maintenance (TPM) program results is cost saving because it minimizes the need for "next day" delivery of parts. In reality, few manufacturing plants implement these proven methodologies for

maintenance optimization that incorporate cost considerations. Monitoring costs associated with "fixing it when it breaks" can help identify deficiencies in the inventory management. For example, tracking costs associated with expediting deliveries of replacement parts is an effective method for identifying opportunities for cost saving related to the equipment or facility maintenance. Reliable cost tracking of both predictable and unpredictable maintenance-related costs is an integral part of a well-managed maintenance program.

Improve how work is performed

Considerations of "who does what and how" are important for efficient and cost-effective maintenance programs. Some manufacturing plants hire maintenance planners, implement scheduling programs that are interfaced to the CMMS and increase utilization of mobile devices to achieve this goal.

Terry Wireman, author of *Total Productive Maintenance* (Industrial Press 2004), reports that one study evaluating the productivity of skilled maintenance mechanics found that "wrench time" – the actual time mechanics spend repairing equipment – averages at most two to three hours per day, while the rest is "non-wrench time," such as time spent walking to/from equipment to be repaired, finding parts in the storeroom or waiting for equipment to become available. A maintenance planner can substantially increase the productivity of highly skilled personnel by reducing non-productive time through planning steps such as scheduling work in advance, allowing the maintenance technician to perform work on a route, (performing work on equipment in specified order) and completing work on machines in one area before moving to the next. Analysis of overall productivity of maintenance technicians can lead to substantial cost saving through a well-planned maintenance program.

Efficient scheduling is an important component of planned maintenance. Many legacy CMMS programs contain scheduling modules that are less robust than needed, for example, one leading program tracks work performed by the day, when most maintenance work is tracked by the hour. In addition, many legacy programs do not account for holiday or weekend days when the facility would be closed and work would not be performed. Investing in a feature-rich maintenance scheduling program and interfacing it with the CMMS could help overcome some of these shortcomings.

Often productivity is a function of the tools available to the maintenance staff. Mobile devices have been shown to contribute to increased overall productivity. Mobile devices with scanning capability facilitate data entry and largely eliminate errors, thereby improving the quality of the data entry and reducing overall time needed for that task.

MAINTENANCE MANAGERS WHO UNDERSTAND THE NEED TO INCLUDE THE WAGE COMPONENT FOR A RELIABLE COST ASSESSMENT OFTEN RESORT TO ALTERNATIVES SUCH AN APPROXIMATE COST BASED ON AVERAGE RATE. THIS APPROACH OFTEN LEADS TO COST UNDERESTIMATION WHEN THE WORK IS PERFORMED BY SENIOR MAINTENANCE EMPLOYEES, OR THE WORK IS PERFORMED DURING OVERTIME.

The iPad mini and Windows Surface tablet are popular among technicians. Instead of recording work performed in a tiny notebook and then waiting in line to enter the data in a shared computer, data on work performed can be recorded as it occurs on a mobile device. In addition, work orders and other maintenance critical information can be transmitted to technicians via mobile device, eliminating the need to print out work orders, and the time required to deliver the work orders to the technicians.

Identify source of excessive equipment maintenance cost

Identifying the source of excessive maintenance costs is critical for making informed decisions related to replacing or continuing to repair the equipment. Periodical review and analyses of these failures and related costs helps identify equipment or sub-components of equipment that are "responsible" for maintenance costs exceeding above expected or normal levels.

When critical equipment has subcomponents it is also important to reflect the hierarchy of the equipment components when tracking the work performed. For example, the chiller in an air-conditioning system has sub-components such as evaporators, compressors and condensers. In many leading CMMS programs, the chiller could be referred to as the "parent" equipment and the sub-components are referred to as the "children" equipment. If the parent equipment is listed in the CMMS, and the related sub-components are not identified, then work orders can only be written to the parent equipment. Therefore, analyses of the equipment failure is more time consuming and difficult in these cases. Linking work orders to the specific sub-component is therefore recommended. The cost information of the parent and children equipment will help identify the specific "bad actor" that needs to be

addressed instead of implicating the entire system.

Information on sub-component equipment can be collected by the maintenance staff that repairs the "family" of equipment and the equipment and family relationship can be loaded into most leading CMMS via excel spreadsheet or sequel scripts for data entry. Older systems may not have this import feature, so the assets or family relationship may have to be entered manually, however, keep in mind this data entry would need to be done only one time. Data collection and loading is the easy part of the process of adding sub-component equipment. The difficulty is deciding how far to drill down in the asset structure. Facility maintenance involves the upkeep of buildings, for example. Work may be tracked to floors in the building, to individual rooms and even to equipment within the rooms, such as equipment outlets. While it may be beneficial to know that an equipment outlet has been repaired, the time required to create a complete asset family for each sub-component of the building may be extremely time consuming. For a very large facility with 30 buildings, this is often not possible. So, the benefits of very detailed asset family needs to be weighed against the time and effort needed to create such a detailed family structure.

In most CMMS, preventative maintenance work is halted when equipment is marked as being out of service. If the equipment has not been marked out of service, PMs may still be generated for that equipment and work performed by uninformed technicians. This is a waste of time and effort. Obsolete equipment is often not marked either in the CMMS, and the equipment is available for selection on a work order. If the technician did not know that equipment was no longer being used by the facility, unnecessary work could be performed as well. Taking the time to periodically identify which equipment is out of service or obsolete could save time and money.

Eliminating costly repair of equipment that should be replaced, and halting maintenance effort on out-of-service and obsolete equipment will reduce overall maintenance costs without reducing maintenance efficacy. **PEM**

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