The Industrial Maintenance Management and Implementing Maintenance Policies for Improvement in Productivity

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Abstract:
As a consequence, of the implementation of advanced manufacturing technologies and just-in-time production systems, the nature of the production environment has changed during the last two decades. This has allowed companies to massively produce products in a customized way. But the increase in automation and the reduction in buffers of inventory in the plants clearly put more pressure on the maintenance system. The present maintenance management policy has been proposed in order to diminish this pressure. Whatever the policy an organization adopts, it has to be evolving to continue being useful against the fast changes that occur in business, communications and industry. Most companies lack a formal method to address maintainability during the project delivery process, yet maintenance can seriously affect productivity. This paper outlines the proposed model process and describes the potential roles and benefits of maintenance policy [1].

Keywords: Maintainability, Maintenance, Organization, Production Environment, Productivity, Maintenance Policy,

1. Introduction

Maintenance is defined as the combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function. In the same standards, maintenance management is defined as all the activities of the management that determine the maintenance objectives or priorities, strategies, and responsibilities and implement them by means such as maintenance planning, maintenance control and supervision, and several improving the methods including economical aspects in the organization. The maintenance management policy can be viewed as one of the basic and integral parts of the maintenance management function. The maintenance management function consists of planning, organizing, implementing and controlling maintenance activities. The management organizes, provides resources (personnel, capital, assets, material and hardware, *etc.*) and leads to performing tasks and accomplishing targets. Once the plans are created, the management's task is to ensure that they are carried out in an effective and efficient manner. Having a clear mission, strategy, and objectives facilitated by a corporate culture, organizing starts the process of implementation by clarifying job and working relations (chain of command, span of control, delegation of
authority, *etc.*) [2].

2. Maintenance Management Policy

2.1 The Maintenance Schedule

It is generally accepted that, in any maintenance department where there are more than 10 crafts persons and more than two or three crafts, some planning, other than day-to-day allocation of work by supervisor or leadsperson, can result in improved efficiency. As the size of the maintenance organization, for example, scheduling, increases, the extent to which work planning can be formalized and the amount of time that should be spent on this activity are increased. There should be only as much planning as necessary for maximum overall efficiency so long as the system costs less than the cost of operating without it.

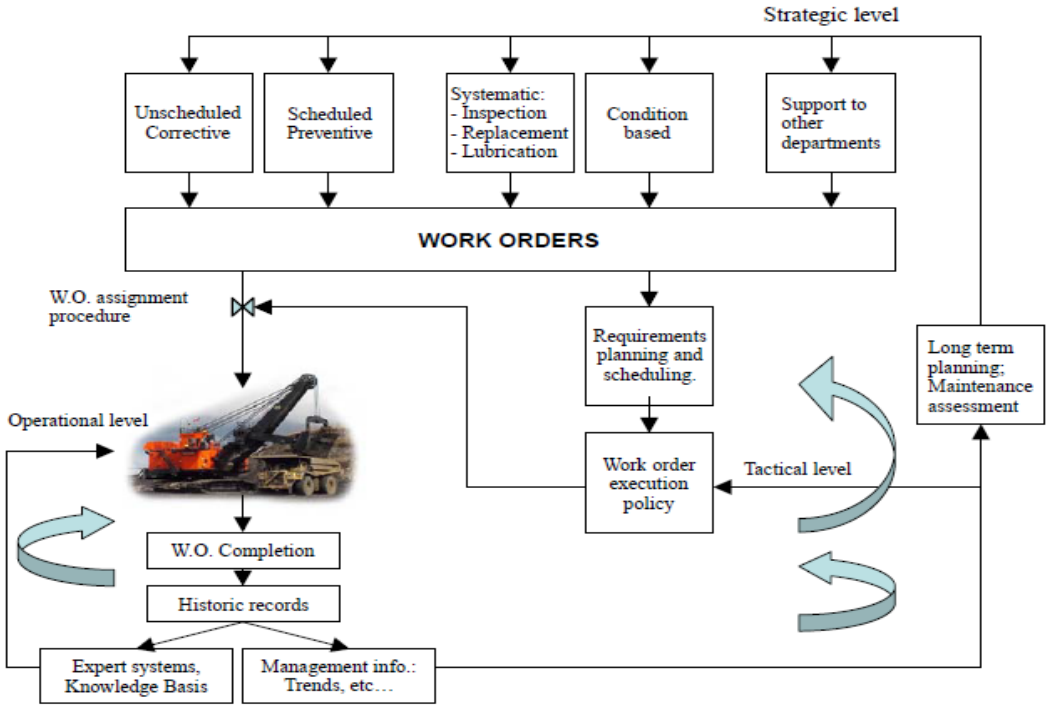

Fig: 1. The Maintenance policy [3].

2.2 The Procedure for Scheduling

There are practical limitations to any scheduling system. A very detailed schedule that because of emergencies becomes obsolete after the first hour or two of use is of little value. If, however, actual performance indicates from 60 to 80 percent adherence during normal operation, the value of the schedule is real. Justification of any scheduling system requires proof of its effectiveness in dollars saved. Where some form of incentive system or work measurement exists, such proof is readily available. But in most maintenance departments no such definitive method is available and the only criteria of measurement are overall trends in maintenance costs and quality of service. Some aspects to be considered in arriving at a sound work-scheduling procedure are work unit, size of jobs scheduled, percent of total work load scheduled, and lead time for scheduling.

Work Unit. Most detailed schedules are laid out in terms of labour-hours or, if standard times are used, fractions of hours. Other scheduling systems use a half craft-day as a minimum work unit. Others may use a craft-day or even a craft-week as a basis.

Size of Jobs Scheduled. Some work-scheduling systems handle small jobs as well as large ones. Others schedule only handle major work where the number of crafts persons and the length of time involved are appreciable.

Percent of Total Work Load Scheduled. Although in some cases all work may be scheduled, the most effective systems recognize the inability of any maintenance engineering department to anticipate all jobs, especially those of an emergency nature, and do not attempt scheduling for the entire work force. A portion of the available work force is left free for quick assignment to emergency jobs or other priority work not anticipated at the time of scheduling.

Lead Time for Scheduling. Lead time for scheduling, or the length of time covered by the schedule, is another variable to be considered. Some scheduling systems do not attempt to cover breakdown repairs and are limited to the routine preventive maintenance and to major work that can be anticipated and scheduled well in advance. In these cases a monthly or biweekly allocation of manpower suffices. In most instances, however, a weekly schedule with a 2- or 3-day lead time results in good performance, yet is sufficiently flexible to handle most unexpected work. In extreme situations a daily schedule with a 16- to 18-hr lead time may be necessary to provide the necessary control. A more workable solution for this situation, however, involves use of a master schedule for a minimum of 2 weeks with provision for modifying it daily.

3. Selection And Implementation Of A Scheduling System

3.1 Flow-of-Work Requests.

Before any formalized scheduling program can be initiated, the method of requesting work from the maintenance department should be formalized. This request may take the form of a work description or job ticket, listing labour hours or equipment requirement, or it can be in the form of a work sheet on which the same type of information is accumulated by either verbal or written communication. Regardless of the form this information takes, it must be routed to one central point if a scheduling system is to be used. In a small plant this can be the supervisor, self direct team leader, the maintenance superintendent, or the maintenance engineer. In a larger maintenance department it should be through a staff individual or group. The amount of information on the work request depends upon the type of talent used in the scheduling group. If the individual charged with planning is completely familiar with the job requirements and can determine the craft skills and labour-hours involved, the necessary equipment, and any other information required for scheduling, a summary of the jobs will suffice. On the other hand, where complexity of work is such that it is practically impossible for any individual to have this information, or if the person charged with scheduling does not have the training necessary to analyze the work, then the information on the work request must be presented in more detail. The number of labour-hours required, by craft, the timing, the relation between crafts, the location and availability of parts and equipment, and any special requirements concerning coordination with production schedules or personnel should be included. In addition to job information required for planning, it is equally important to have a feedback on actual performance in terms of notification of completion and actual time consumed, by craft. This may be incorporated in the work-request system, but provision must be made for channelling this information back to the scheduling centre. The scheduling system should also provide for work scheduled but not completed becoming a part of the work backlog. As such, it is considered, along with new work, for new scheduling.

3.2 Determination of Priority.

In any maintenance organization which is efficiently manned, the work load, in terms of quantity or timing, exceeds the availability of men and/or equipment. For this reason the problem of defining the order in which the work is to be carried out, or establishing priority, exists and is an important factor in scheduling. In a small plant with one operating department and a small maintenance organization, establishment of priorities may amount to casual discussion between maintenance and production. However, as the plant grows and the maintenance department is called upon to provide service to more than one production department, the problem of equitable and efficient priority assignment becomes more involved. One of the most serious problems in maintaining good relations between maintenance and production departments is in this sphere. Too frequently personalities, working conditions, accessibility, or geographic location with respect to central shops influence the order of work assignment. This may decrease the overall efficiency of the plant. The means for determining work priority figures most importantly in the establishment of a work-scheduling system. On the surface a solution to this problem would reserve decisions concerning priorities to an individual who is in position to judge the effect on overall plant performance.

In a plant of any size, it is usually most effective to handle such decisions at a lower level of management, with the plant manager having the final say when no decision as to priority of work can be reached. A method which has proved satisfactory in many instances has been to assign a rough allocation of craft manpower to each production department, then to establish the priority of work within each department by consultation with its supervision. When it is necessary to vary the allocation of men, this should be done by negotiation between production departments to arrange a mutually agreeable exchange. If such a reallocation cannot be concluded, as a last resort the plant manager must make the decision.

3.3 Coordinating and Dispatching.

In the execution of an effective scheduling system it is necessary to compromise with the practical considerations of getting the work done, and done economically. If a supervisor or team leader guided his or her crafts persons on the assumption that the job must be completed at the exact time he had estimated and then continued to assign work on the basis of his estimate of the time necessary, it is obvious that confusion, incomplete work, and idle craft time would result. A formal schedule, issued weekly and followed blindly, would have the same effects. Instead, the schedule should be used as a guide, and modifications can be made as needed. Rapid communication of such modifications to the men responsible for carrying them out is essential to the success of a work schedule. It is also essential that any changes or unexpected work for which provision has not been made in the schedule be funnelled through the dispatch centre. Usually the dispatch centre can incorporate this type of work more efficiently than is possible by random selection of the nearest craftsmen or injection of higher authority into the picture [4].

4. Preventive versus Breakdown Maintenance

Preventive maintenance has long been recognized as extremely important in the reduction of maintenance costs and improvement of asset reliability. In practice it takes many forms. Two major factors that should control the extent of a preventive program are first, the cost of the program compared with the carefully measured reduction in total repair costs and improved asset performance; second, the percent utilization of the asset being maintained. If the cost of preparation for a preventive-maintenance inspection is essentially the same as the cost of repair after a failure accompanied by preventive inspections, the justification is small. If, on the other hand, breakdown could result in severe damage to the asset and a far more costly repair, the scheduled inspection time should be considered. Furthermore, in the average plant preventive maintenance should be tailored to fit the function of different items of equipment rather than applied in the same manner to all equipment. Key pieces of equipment in many other integrated manufacturing lines are in the same category. Conversely, periodic inspections of small electric motors and power transmissions can easily exceed the cost of unit replacement at the time of failure. Indeed, a program of asset or component replacements can result in considerably lower maintenance costs where complete preventive maintenance is impractical. In a plant using many pumps, for instance, a program of standardization, coupled with an inventory of complete units of pumps most widely used, may provide a satisfactory program for this equipment. This spare-tire philosophy can be extended to many other components or subassemblies with gratifying results. Sometimes, instead of using a centrally administered formal preventive program, qualified mechanics are assigned to individual pieces of equipment, or equipment groups, as mechanical custodians. Operating without clerical assistance and with a minimum of paperwork, these men, because of familiarity with equipment and ability to sense mechanical difficulties in advance, can effectively reduce maintenance costs and breakdowns. These compromise devices can frequently be used to greater advantage, even in plants where equipment is not in continuous operation and a more comprehensive preventive program might be set up.

Periodic shutdown for complete overhaul of a whole production unit, similar to the turnaround period in oil refineries, is another method of minimizing breakdowns and performing maintenance most efficiently. Unfortunately, this is a difficult approach to sell to management of a 7-day, around the- clock manufacturing plant not accustomed to this method. One of the most effective methods of tempering ideal preventive maintenance with practical considerations of a continuous operation is that of taking advantage of a breakdown in some component of the line to perform vital inspections and replacements which can be accomplished in about the same time as the primary repair. This requires recording of deficiencies observed during operating inspections and moving in quickly with craftsmen and supervision prepared to work until the job is done. Production supervision usually can be sold the need for a few more hours' time for additional work with repair of a breakdown much more easily than they can be convinced of its necessity when things are apparently running smoothly [5].

References

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