



Better strategy to preventive maintenance programs is always not bitter for execution of facility management tasks (Property management)

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ABSTRACT

A well planned preventive maintenance programs lead to diminishing the numbers of the reactive maintenance tasks, and it helps to maintain satisfactory equipment conditions and improve property reliability. It is the duty of a Facility manager to plan better Preventive programs through creates a register of all assets and groups it into systems and subsystems. Further the facility manager who schedules the assets by the degree of importance or critically after analyzing the cost of performance life cycle of all assets including replacement cost based on their priority. For analyzing key performance indicators (KPI) to know the performance of his squad, the facility manager must prepare preventive maintenance checklist after getting the best advice for his routine inspections and examinations of all site tools. A better flexibility strategy principle, which stretches best, planned a preventive program that helps to get good results for a facility manager. And for organizing preventive maintenance plan, it needs to have right people on the board with the plan include top management, Facility manager, experienced Supervisors, technicians, and any other staffs who understand the system operates including people from data processing, accounting, craftsman because the Facility manager is specialist rather than a generalist. Training to technicians is to operate the CMMS (Computerized Maintenance Management system) unavoidable because it gives technicians the freedom to focus less on paperwork and more– on maintenance. A well systematized planned preventive maintenance programs determine the aptitude of a facility manager and his respective site with the prominence of his company.

Keywords— *Assets, Check list, Facility manager, Plan, Planned preventive maintenance program, Reactive maintenance, Schedule*

1. INTRODUCTION

Preventive maintenance and reactive maintenance are an extremely critical part of facility management operation. By creating a preventive program to decrease the incidents of equipment arriving late for preventive maintenance's, they are due for, this program can be an integrated part of saving & reduction of equipment downtime for repairs. If the preventive maintenance program is working correctly the reactive maintenance is the repairs request that is written up by the operators at the end of their day. The repairs must be completed overnight enabling the crews to continue their work in the morning. A scheduled preventive maintenance program is systematically method of planning, proactive system inspection along with servicing and repairs performed at specific intervals. Effective equipment management requires that repairs be made before failure. This involves a preventive maintenance approach to provide for systematic, periodic servicing of equipment to facility operations minimum downtime.

1.1 Meaning & importance of planned preventive maintenance

¹“Preventive maintenance is defined as regularly scheduled inspections, tests, servicing, replacements, repairs and other tasks intended to help reduce the impact and frequency of equipment failures. This includes scheduled preventive maintenance, predictive maintenance, and inspection activities.

1.2 The objectives of a preventive maintenance program are to help:

- Identify maintenance actions on important equipment and incorporate that into the preventive maintenance program activities that result in the greatest benefit within the available budget.
- Minimize corrective and breakdown maintenance, maintain satisfactory equipment conditions and improve plant reliability
- A preventive maintenance program should be well defined, periodically reviewed and adjusted as necessary. To help ensure proper implementation, procedures should be written in sufficient detail for each piece of equipment in the program”.¹

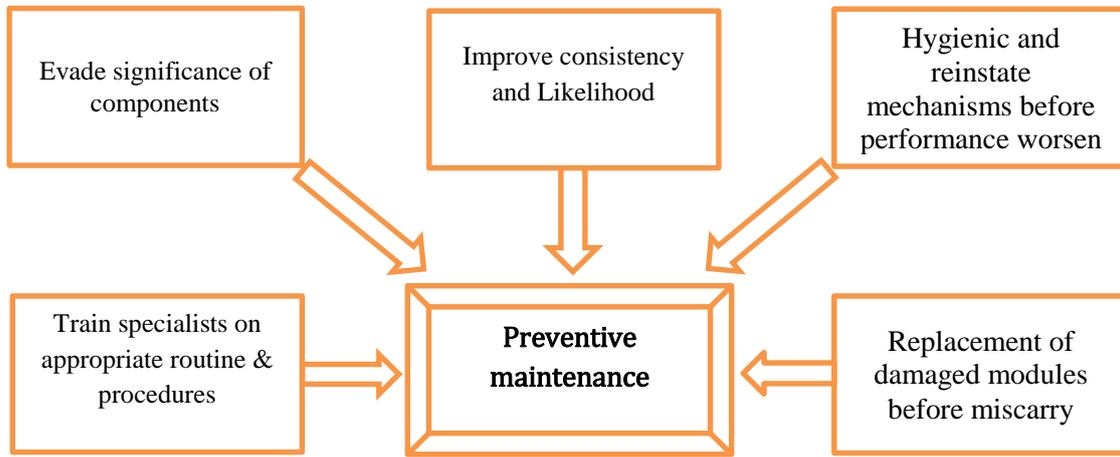


Fig. 1: Nature of planned preventive maintenance

Why is preventive maintenance important ²“The purpose of preventive maintenance is to try to maintain the equipment in optimum working condition and to help prevent any unplanned downtime due to breakdowns because components start to wear over time, replacing items prior to failure can cost you far less than the potential consequences of failure while in service. Some people see maintenance as an expense and it can often be one of the first departments to suffer from cuts during difficult times, however, this is very much false. Preventing problems from occurring will almost always be far less than the costs you will incur due to actual failures.”²

1.3 Why is preventive maintenance better than reactive maintenance?

“**Reactive maintenance** is a strategy based on performing maintenance operations only after a breakdown occurs (which is why it is often called **breakdown maintenance** or **run-to-failure maintenance**). In practice, the approach translates to costly unexpected shutdowns, breakdowns that decrease the lifespan of assets and many other drawbacks that significantly increase overall maintenance costs.

And **Preventive maintenance** (also called **preventative maintenance**) is the direct opposite. It relies on routine maintenance tasks to keep equipment up and running. Significantly reducing reactive maintenance with preventive maintenance (and the help of a CMMS) provides more control over maintenance operations and helps prevent equipment breakdown and unplanned shutdowns.”³

Therefore a well scheduled/planned preventive maintenance tasks, which lead to decrease the numbers of Predictive maintenance tasks, it shows the ability of a facility manager how he executes the facility management tasks in site to achieve the business goals of the company who belongs to.

Furthermore, the planning, scheduling, and checklist are vital benchmarks to formulate a worthy preventive program, in case the facility manager miscarries to do accurately, the lifespan of entire equipment at the site will get down at the earliest. In the following paragraphs, it is discussed in detail manner.

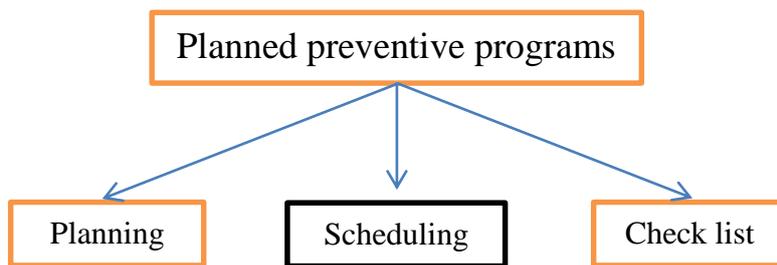


Fig. 2: PPM program relationship with planning, scheduling, and checklist

2. HOW TO SET UP A PREVENTIVE PROGRAM (PLANNING)

A preventive maintenance plan helps to stay on top of maintenance, repairs, and parts replacements so it can avert equipment catastrophe before it ever happens. Preventive maintenance will also keep facility management operation running smoothly and efficiently, persist the lifespan of equipment, and diminish whole maintenance costs.

And by means of so many obvious benefits to performing preventive maintenance, it is necessary to know how to implement an effective preventive maintenance plan. Implement the best preventive maintenance plan possible with the help of our industry-leading CMMS software.

Step 1: Get the right people on board

Before begin to organize preventive maintenance plan, it needs to have the right people on board with the plan include top management, maintenance managers, maintenance technicians, and any other staff who understands the system operates including people from data processing, accounting, craftsmen, and members of production and production control.

It is not possible to get contribution (input) from each of them at every step of the process, but it is important to have them on board and kept up to date, and it leads to getting significant feedback.

Step 2: Set Goals to Preventive Maintenance Plan

An account of getting a good result, it is necessary to use the assignment force's input (contribution), set goals facility manager hopes to achieve using the system, and begin training the task force on the computer skills they will need when the Preventive maintenance plan goes into full effect.

Step 3: Inventories of the equipment and assets

It is necessary to create “**list of all the assets**” of site accountable by a Facility manager or site engineer or supervisors, and record the below-mentioned details and that this process is much easier to carry out and organized with the assistance of good preventive maintenance software program.

- “Make and model of the equipment.
- Serial number.
- Basic specification and capabilities.
- Asset number, brass tag number, or unit number.
- Category (HVAC, Plumbing, etc).
- The location of the equipment.
- The department who holds responsibility.
- Any high-cost items of the asset”⁴

This information will help to the facility manager later track costs and help determine whether a piece of equipment needs to replace by now, and it is necessary to hardware supervisors take note of the equipment's current conditions and rate its level of priority in relation to the overall operation.

Step 4: Make a decision

It is the liability of a Facility manager through respective supervisors to identify the status of equipment at the site, who can determine this by asking these questions

- “Is it operating to manufacturers' specification?
- Is it high priority asset”⁵

Once the facility manager is used these questions to analyze the site equipment, who determines how the site assets are performing and set a reasonable operation goal after comparing the site system's actual performance to his operational goals to determine which systems need the most attention .while planning, the Facility manager must keep in his mind , it is not possible to include every piece of equipment in the Preventive maintenance plan because some equipment is just old and worn out, and reactive maintenance plan may actually be a more cost – efficient method in these case .

Hence the facility manager needs to observe the cost of repairs or replacement, how often this maintenance is typically performed, and what level of priority the equipment has. Later he creates as “**task list**” of per piece of equipment along with approximate time and skill level required for each task in the plan.

A good facility managers' plane must have the following characteristics such as:

- The repair/replacement costs are high
- Maintenance has to be performed routinely
- The equipment is critical to company' success⁶

It is more essential to the Facility manager, who is better to leave the replaced or repaired once the equipment break and makes sure to schedule the modernization of those units.

Step 5: Get to know the Owner's Manuals

It is most advisable to the facility manager, who must read the owner's manual and warranty conditions to determine which is best for each piece of equipment individually to figure out the best tasks for preventive maintenance after prepared a list of candidates for execution the preventive maintenance program. The facility manager/site Engineer decides preventive maintenance clocks that indicate wear of the site piece of equipment. And who also set the clock by a number of days elapsed, run-time hours, etc.

Step 6: Schedules for long-term preventive maintenance

The preventive maintenance team headed by the facility manager starts with one piece of equipment and adds as to continue. Furthermore, this team use the first piece of equipment, create a schedule for the year, broken down in to daily, weekly, monthly, quarterly, bi-annual, and/or annual tasks, they keep the manufacturer's guidelines to determine their schedule until each piece of each equipment has a long-term plan . It is likely to be revised the long-term operating procedure many times throughout the first year by the PPM planning team. “The preventive maintenance software will allow the auto – schedule preventive maintenance based on elapsed time periods or other readings, and will automatically generate an editable schedule of pending and active orders and regularly review the reports from the preventive maintenance software to watch for items need to plan for”⁷

Step 7: Schedules for the short-term preventive maintenance

After planned for year, it is easy for the PPM team creating weekly plans to be performed at pre-planned equipment downtime, but need to give necessary flexibility for work orders that come in from preventive maintenance inspection or reactive

maintenance needs, and prioritize of tasks, eventually creating a balance by adding or subtracting maintenance tasks and team members.

Step 8: Training

The Planned preventive team needs discussing to each machine operator and demonstrates correct procedures for daily maintenance and adjustments. Train them in service and repair procedure, and make sure they understand how to safely use the equipment. Use simple log forms so that machine operators will use them. Schedule a few minutes before and after each shift to inspect, lubricate, and clean up.

Thus proper planning of planned preventive activities along with proper schedules to the equipment of a site always gives the right maintenance at right time at the lowest overall cost.

3. PREVENTIVE MAINTENANCE SCHEDULES

“Preventive maintenance is regularly scheduled inspection (checkup), tests, servicing, replacement, repairs and other tasks intended to help reduce the impact and frequency of equipment failures. This includes scheduled preventive maintenance, predictive maintenance program, and inspection activities.”⁸

In general, there are two types of procedure schedules existing in facility management of Property maintenance, such as single procedure schedules and multiple procedures schedules.

3.1 Single procedure Schedule (SPS)

It has been carried out by the team of PPM through / run a single procedure at a given interval of time that is monthly/ quality and the Single procedure schedules are further categorized into Time based- fixed schedules (a procedure scheduled to run every three months, on the 10th of every month), floating based- floating schedule (a procedure scheduled to run every three months, with the “actual work order completion date” and Meter based- fixed schedule (a procedure scheduled to run every 3000 units) and Meter based -floating schedule (a procedure scheduled to run every 3000 units, with the “actual meter reading” at the time the work order is closed determining the next the scheduled maintenance.

3.2 Multiple procedure schedules (MPS)

It has been carried out by the team of PPM through / run different procedures at different intervals and the schedules are defined (well- defined), hence all procedures are run at intervals that is all procedures run at intervals, which are multiples of the recurrence (frequency) specified on the Schedule pages.

The monthly procedures would have an interval of “1” and the quarterly procedure would have an interval of “3” (at the third schedule monthly recurrence) and the annual procedure would have an interval of “12” (at the twelfth schedule recurrence).

It is further categorized as Time based-fixed schedule (Multiple procedures schedule at run at monthly, quarterly and annual intervals), Time based - floating schedules (Multiple procedures scheduled to run at 30,90,120 days intervals, with the “ actual work order completion date “ determining the next scheduled maintenance) ,Meter based - Fixed schedule (Multiple procedures scheduled to run at 7,500, 30,000 and 60,000 units intervals, and Meter based - Floating schedules(Multiple procedures scheduled to run at 7,500, 30,000 and 60,000 unit intervals, with the “ actual meter reading” at the time the work order is closed determining the next the scheduled maintenance) .

While scheduling, it is necessary to keep in mind by the PPM scheduler or PPM programmer or site engineer to include at the scheduling pages an option to combine meter and time base schedules, performing whichever occurs first. It is described by a simple example as stated: **Tune up procedure on delivery van might be performed every 60,000 miles or after three years, whichever occurs first”**⁸

3.3 How to create a preventive maintenance schedule

“A well-executed preventive maintenance schedules outcomes in reduced breakdowns and cost savings. Many organizations-with moral plans or hire -out preventive maintenance programs and schedules, only to file them away within a few months. A preventive maintenance schedule begins to formulate once a few gaps in information are filled. Timing, as well as the tasks, is crucial for carrying out an effective Preventive Plan.”⁹

The common items, such as, Accounting records, Service history which is needed to determine the timing and tasks, the first and foremost step is to create “a register of all assets” and group it into “systems” and “subsystems”

For example, list each structure or building individually. Next, list the associated systems that are common to all buildings. Examples of included systems are air conditioners, lighting/ electrical systems, plumbing and electronic system. Subsystems or individual components might include individual air conditioners, specific lighting panels, certain boilers and the like.

The second step is prioritize / list / arrange the assets by “degree of importance or critically” because the system failures that would directly affects safely, operational performance or comfort and convenience, and it is essential to give premier priority to “systems affecting safety of personnel” and that the plan shall be created for this system first -before moving on to less critical equipment.

The third step is to be analyzed the cost of performing life cycle of all assets including replacement cost based on their priority and the life cycle cost includes the initial purchase, labor, and part, expended towards the asset over its entire useful life. Forecasting future costs are possible based on historical cost and the asset’s rate of deterioration. And the replacement cost of each asset is essential in determining the amount of time and money invest toward its preventive maintenance.

It is the duty of the facility manager along with site engineers, as a group along with entire staff to engage in the development of the preventive maintenance schedule as soon as possible and it is also unavoidable to engage to allow the technicians and staff, those who execute the schedule to be involved in its development. This conveys a sense of ownership and creates contractors whom by now have an interest in the Preventive maintenance plan and schedule succeeding.

It is constantly to monitor asset performance once the schedule is put into practice. Tracking the number of breakdowns –and what broke will help analyze the schedules effectiveness. After a few months, scheduling adjustments are needed based on current asset performance trends. Some task intervals will be extended, while others will be shortened. Continuously monitoring and correcting the Preventive schedule ultimately results in a best – in – class Preventive program.”⁹

Hence the scheduled preventive maintenance is the heart and soul of all efficient equipment management operations. An efficient planned preventive program will reduce peaks and valleys in repair volumes. Sound PPM program enhances risk management. A well-maintained equipment is a usually safer equipment to operate. In addition to safety, the documentation included in a proactive Preventive maintenance program can be invaluable in the courtroom and the scheduling intervals allow for a determination of when and how often a PM activity will be performed. Local usage and environmental conditions, as well as manufacturers recommendations, should be taken into account when establishing PM schedules.

However, without assigning the proper checklists activities of site equipment by the Facility manager thro the ugh his squad, it is very difficult to implement the Preventive programs in successful manners.

Checklist

It is quite difficult to manage multiple assets and tools through manual repair sessions in facility management for execution of PPM tasks. For this reason, a facility manager must draft a preventive maintenance checklist to make service events much more streamlined. With details on vendors and vendors and manufacturers available, the facility manager can easily get the best advice for routine inspection and examinations of all site tools, listing down all maintenance activities allows the Facility manager to measure progress and design budgets for replacements when needed.

4. A PREVENTIVE MAINTENANCE CHECKLIST

“Normally the checklists come in two versions such as simple checklists and advanced checklists, the simple version which is used for Lite and Pro and users and a simple checklist is basically to do list that can be added to ensure all of the necessary steps are taken to complete the needed work. This ensures that vital tasks in the repair process are not missed, which can help decrease machine downtime, and save companies money. When setting up a simple checklist, tasks can be written in order of how they should be performed, or in order of importance.

4.1 Advanced checklists are exclusive to pro users, more in-depth and can have different response types such as a short answer. Whole or decimal numbers and multiple choices. The various response type users to get more specific data than the simple checklist.”¹⁰

The Use the list below as a guide to help ensure a Facility manager does everything that can to maintain an efficient facility.

4.2 Lighting

“Inspect at regular intervals, with group relamping when lamps to fail. Any luminaries that have transformers, control gear or accessories, such as spread lenses, glare baffles or color filters should be routinely checked. Check exterior lights to make sure cables are ‘not torn; all screws and hardware should be in place and working. Gaskets can be replaced to help provide a better watertight seal. Replace any burned –out lamps and consider group re-lamping (to create relamping schedule, calculate lamp life and how often lamps are used). Ensure that each lamp has the same color temperature. Re-aim adjustable lighting if necessary. Dust lamps and clean lens surface to enhance lighting performance. Check all exit, interior & exterior lightings for proper installation and function.”¹¹

4.3 Electrical

“Change batteries in smoke and carbon monoxide detectors, flashlights, and test instruments .confirm that timers and photocells are functioning correctly. Inspect cover plates for cracks and proper tightness. Inspect and clean exhaust fans”.¹²

4.4 Safety

“Check inventory and restock all first aid kits. Check eyewash bottles and stations. Ensure safety sign and equipment labels are in good condition. Inspect and clean respirators. Inspect fall protection harness and kits.”¹³

4.5 HVAC and pneumatics

“Clean the air intake as needed, Change air filters as needed. Check blower motors in operation for excessive noise or vibration. Clean motors and ductwork as needed. Check the condensate drain pans for proper drainage .check the flexible duct connectors. Secure any losses guard and panels - Inspect the condition of all electrical hardware and connections, - Test the safety controls and equipment,-check for proper operation of the interior unit. During the cooling season, - Inspect the condenser motor bearings for excessive noise or vibration a) Inspect the condenser air intake, discharge, and coil as required b) check the condition of all refrigerant piping coil as required c) check the condition of all refrigerant piping and insulation. d) Check the operation or access panels. d) Inspect compressed air lines regularly; investigate any leaks in the piping tubing or fitting. e) Replace or clean air filter elements at least quarterly, or as necessary depending on the application. f) Monitor oil levels on air compressor pump and replace as necessary depending on usage.”¹⁴

4.6 Building interior

“Examine the condition of floors, ceiling, and walls for evidence of deterioration .check for visible signs of leaks. Inspect for hazards (electrical, mechanical, structural, physical, tripping etc). Check the condition and Operation of faucets, toilets, and showers. Test smoke and carbon monoxide detectors. Test fire alarm system. Check the firefighting equipment. Check all doors for proper operation of faucets, toilets, and showers, Test smoke, and carbon monoxide detectors. Test the fire alarm system. Check firefighting equipment. Check all doors for proper operation: ensure that exits are not obstructed. Inspect the conditions of door locks and closures. Ensure work areas and walkways are properly marked. Check for accumulation for trash in storage areas. Check for evidence of insect infestation. Inspect wear or cart casters and that shelving is properly labeled, organized and secure”.

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4.7 Building exterior

“Examine the condition of the paint and walls. Check for broken windows and doors. Examine the conditions and doors. Examine the conditions of the railing. Check for plants growing on the building or its foundation. Clean the doors as needed. Use care when working in high places; employ adequate fall protection. Clean roof drains and gutters as needed and test drain and downspouts by flushing them with water. Inspect the condition of the roof. Inspect gutters for adequate anchoring and tighten if necessary. Inspect the stack and all roof penetrations. Remove any plant life growing on the roof. Clean up any debris found. Check the grounds for broken glass and debris. Examine the condition of the sidewalk and driveway, parking area. Check the stormwater drains. Check the conditions of plants and lawns. Examine the conditions of tress; verify that no branches are about to fall and Examine the condition of any fencing”.¹⁶

4.8 Plumbing

“Inspect plumbing at least annually; investigate any leaks or unusual noises. Domestic water booster and circulation pump systems require bearing lubrication at least annually; inspect coupling and check for any leaks. Domestic water heaters and boilers should be fire – tested periodically, using flue- gas analysis to adjust the flue draft and combustion air input to help optimize efficiency. Remote drinking water chillers need condenser fan motor bearings lubricated annually. Check all contacts for wear and pitting, and run system control tests. Pump down the system and remove the refrigerant according to manufacturer instructions. Drain & replace oil in the compressor oil reservoir, including filters, strainers, and straps. Sump and sewage ejection pumps are replaced on an as-needed basis but should be checked for function. Exposed pumps should lubricate annually”.¹⁷

Consequently, the planning, scheduling and checklist activities are more important to frame very successful planned preventive programs of site equipment, and a facility manager must follow the concept of flexibility. Each organization must establish preventive maintenance programs parameters specific to its own budgetary and quality constraints. The demand on maintenance budgets too often restricts a quality proactive team to facilitate preventive maintenance properly; subsequently, mechanics are reduced to reacting to break down after a break down rather than approaching each piece of equipment with the intent of facilitating fluid, filters or belt changes as required in a timely fashion. Breakdowns will happen as units are operated, but the stress chasing breakdowns and having them pile one upon another tend to discourage and disappoint even the best mechanic.

5. CONCLUSION

By implementing a preventive maintenance program effectively, real-time savings and reductions of equipment costs will be realized. The initial costs of getting started can be minimized by developing a scheduled inventory of filters, oils, grease and other compliments for site preventive programs. When ordered a scheduled and the replenished as required, the costs will not be quite as high. Once a Planned preventive program is put into place it has often been found that maintenance costs rise because of damaged parts not reported. Systematic repairs and qualified reporting has shown a marked reduction in overall costs based on how aggressive of maintenance approach that been initiated.

The site equipment is what makes the facility Manager Company unique and cause the owner /client to keep coming back. It is important that the facility manager can provide for the client /owner what they need when they need it. This will only happen if site equipment is working in top working order. A quality Planned preventive maintenance program shows the talent of a facility manager of the respective site along with the eminence of the company who belongs too.

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