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PREVENTATIVE MAINTENANCE: KEEP YOUR BUILDING RUNNING SUCCESSFULLY

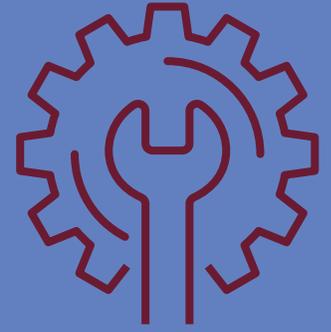
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Preventative Maintenance: Keep Your Business Running Successfully



Overview:

Day-to-day facility operations often become a game of whack-a-mole and it is easy to fall into a role of reactive maintenance. To prolong the life of your facility and the equipment, it may be time to transition to a different approach, known as preventative maintenance (PM). PM is the service that is regularly performed on a piece of equipment to lessen the likelihood of it failing, and is planned and performed during regular business hours (or while your staff is readily available), while the equipment is still working. This helps make sure resources are accessible and the equipment is less likely to break down unexpectedly. Most importantly, the maintenance happens when it can be planned in order to reduce a stressful situation that can arise from an urgent repair on critical equipment.

Preventative maintenance is scheduled based on time or usage. Typical examples of equipment with PM that can be performed at set times are chillers, package rooftop units, or generators. These assets should be serviced every year, typically before summer in Texas, and periodically during the year for routine items.

PM is more complex to coordinate than the traditional run-to-failure maintenance method because the schedule must be planned. While the operation and maintenance manual that you received with the equipment is a good place to start, several factors come in to play when putting together a preventative maintenance plan for your company.

When to Apply Preventative Maintenance

Equipment and building operations that are improved through preventative maintenance include:

- Systems that are more likely to fail due to use or time (moving or rotating machinery)
- Systems that are critical to operations
- Systems that have failure modes that can be prevented or lessened with regular maintenance



Why Preventative Maintenance?

The U.S. Navy first developed preventative maintenance as a way to increase the reliability of their fleet and equipment. The Office of Energy Efficiency & Renewable Energy also reports that preventative maintenance increases reliability, but more importantly to business, it can yield a 12–18 percent cost savings in your facility’s maintenance budget.

PM does not mean that facility managers need to constantly monitor the condition of their equipment. That practice would increase the effectiveness, but it is not a requirement to reap the benefits. In that way, the cost of constant monitoring, also known as instrumentation, can be deferred where systems are not as critical, but the equipment and services can still benefit from regular PM.

Risks of Preventative Maintenance Programs

Preventive maintenance does involve risk that relates to the potential for human errors during tasks that lead to additional failures of the equipment, often occurring soon after the PM is performed. The following errors or damages occur during PM and other types of maintenance outages:

- Damage to nearby equipment
- Damage during the performance of an inspection, repair, adjustment, or installation of a replacement part
- Damage to the equipment being serviced
- Installation of defective material
- Incorrect installation of a replacement part

Data from the fossil-fueled power plant industry suggests that in about 50% of the cases reported, unplanned maintenance outages were caused by errors committed during recent maintenance. This can be addressed through proper inspections, job safety studies, training, and tracking and documentation.

“Unplanned maintenance typically costs three to nine times more than planned maintenance.”¹

Creating a Preventative Maintenance Schedule

Having and maintaining a preventative maintenance schedule is the best way to make sure that maintenance checks occur at the necessary time for each piece of equipment. While schedules will differ depending on the company, the next page lists a sample of equipment types and corresponding maintenance items that includes the frequency at which these items should be checked.



¹ “What Is Preventative Maintenance/Preventive Maintenance?” Fiix, www.fiixsoftware.com/maintenance-strategies/preventative-maintenance/.

Sample of a Preventative Maintenance Schedule

| Equipment Type | Maintenance Items | Frequency |
|--|---|------------|
| Air Handling Units | • Inspect valves and piping for leaks | Daily |
| | • Change filter based off of pressure drop | 3-4 Months |
| | • Grease supply fan motor | 4-7 Months |
| | • Check belt tension | 6 Months |
| | • Check all moving parts for wear | 6 Months |
| | • Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness | 6 Months |
| | • Clean drain pan | 6 Months |
| | • Inspect condensate drain for clogging | 6 Months |
| | • Clean coils | Yearly |
| | • Check and snug all electrical connections | Yearly |
| | • Check ground conductor and connection integrity | Yearly |
| | • Inspect VFD | Yearly |
| Chilled, Condenser, and Heating Water Pumps | • Check piping connections, valves, gauges, etc., and replace/repair as needed | Daily |
| | • Check that the interior and exterior of the motor is clean and is properly ventilated | Monthly |
| | • Perform a dielectric withstand test to ensure that the integrity of the winding insulation has been maintained | Monthly |
| | • Check that all electrical connectors are tight | Monthly |
| | • Lubricate bearings | 6 Months |
| | • Inspect VFD | Yearly |
| Domestic Water Booster Pump | • Check piping connections, valves, gauges, etc., and replace/repair as needed | Daily |
| | • Check that the interior and exterior of the motor is clean and is properly ventilated | Monthly |
| | • Perform a dielectric withstand test to ensure that the integrity of the winding insulation has been maintained | Monthly |
| | • Check that all electrical connectors are tight | Monthly |
| | • Lubricate bearings | 6 Months |
| | • Inspect VFD | Yearly |
| | • Run panel diagnostic | Yearly |
| Fan Coil Units | • Inspect filters and replace as needed | Monthly |
| | • Inspect valves and piping for leaks and replace or repair as necessary | Monthly |
| | • Inspect drain pans and clean as needed | 6 Months |
| | • Clean coil | 6 Months |
| | • Inspect water temperature sensor and clean of dust and debris | Yearly |
| Water Heaters | • Flush and clean water heater tank to remove sediment buildup and remove scale from the heating element | Yearly |
| | • Check the temperature and pressure relief valve | Yearly |
| | • Inspect anode rod and replace as needed | Yearly |
| Transformers | • Inspect physical and mechanical condition | Yearly |
| | • Inspect and clean in accordance with manufacturer's instructions | Yearly |
| | • Inspect bolted electrical connections: Check connections with low-resistance ohmmeter, check torque with torque wrench, or perform thermographic survey | 3 Years |
| | • Perform insulation resistance tests winding-to-winding and each winding-to-ground | 3 Years |

How to Begin Preventative Maintenance

By focusing on Enterprise Asset Management (EAM), companies optimize operations from the perspective of long-term corporate growth. This deviates from the older philosophy of corporate emphasis on short-term profits.

“Effective maintenance can reduce HVAC energy costs by five to forty percent depending on the system or equipment involved.”²

Companies interested in implementing preventive maintenance strategies should start gradually, and the first step is to utilize an asset tracking system. Software is recommended for this, since the data can be tracked and analyzed to identify equipment that is in need of service on a regular basis. Companies can also research the operations manuals of their equipment to find what manufacturers

recommend for best operations. If it has been a while since the equipment has been installed, it is also suggested to perform an energy audit of the installed equipment to see how it is operating, as well as how the overall building or campus is performing, with respect to other similar equipment and buildings.

This provides useful information to tackle the largest contributors to increased operating costs, and those savings could then be reinvested into additional preventative maintenance and equipment enhancements. The PM program would become a self-supporting function through operating cost savings.

PM should focus on cleaning, lubrication, and correcting deficiencies found through testing and inspections. When there is a need to adjust or replace components, it should be done by trained and motivated professionals. Parts replacement should be minimal and done only where evidence clearly indicates the component is worn-out or about to fail. Cleaning should be done to remove dust and dirt, since that can hide defects that can lead to unplanned maintenance outages.

The switch from reactive maintenance to preventive maintenance does not usually occur quickly. However, with training and documentation, it can be implemented properly over time to avoid unnecessary costs and maximize savings.

For a successful preventative maintenance system, it is pertinent to keep certain key factors in mind, including appropriate tracking systems, scheduling, use of professional support, and adequate amounts of time spent training staff.

For more information about preventative maintenance or to view a full maintenance schedule, email us at mail@bhinc.com.

² (2011, September). Studies Show: HVAC System Maintenance Saves Energy. Retrieved from <https://buildingefficiencyinitiative.org/articles/studies-show-hvac-system-maintenance-saves-energy>



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