

Do You Have an *Effective* Electrical Preventative Maintenance Program?

by Larry Pennington, P.E.

Electrical equipment failures account for millions of dollars of lost revenue each year. Historically speaking, almost two thirds of those failures could have been prevented by an effective Electrical Preventative Maintenance (EPM) program.

Studies have shown that failure rates for electrical equipment that are not part of a preventative maintenance program are three times greater than those that are covered by an EPM program. Which would you rather do? Schedule your system outage or work under the stress of getting your facility back on line because of an electrical system failure.

Would you rather schedule your system outage, or work under the stress of getting your facility back on line because of an electrical system failure?

The National Fire Protection Association (NFPA) recognized the need for a suitable document to address this issue. In 1968, the Technical Committee on Electrical Equipment Maintenance was formed and NFPA 70B was created. It offers a plan to reduce hazards resulting from failure or malfunction of electrical equipment and systems through the implementation of a preventative maintenance program. As we all know, equipment deterioration is to be expected, but equipment failure is unavoidable. With an effective EPM program, you can identify the factors that contribute to this normal deterioration and provide means for successfully managing them. In turn, this information can help you reduce the cost of operating your facility by minimizing unscheduled outages due to costly breakdowns. Future troubles can be identified and corrective actions taken before they can become major problems requiring costly solutions.

The first step in the process is to create a plan based on the components that are included in your electrical system. Identify the individual items and gather technical information on them. This will become the basis upon which you will develop the detailed plans and procedures for implementing your EPM. The essential parts of an effective EPM are qualified personnel to implement the plan, a regular schedule for routine inspections and required tests, proper corrective actions based on accurate analysis of inspections and testing and accurate record keeping.

The best program in the world is useless without well-qualified people to implement it. A leader should be assigned the responsibility of ensuring that a program is in place and is followed. This individual should be a qualified electrician with complete knowledge of the electrical system and understand the impact to the facility in the event of a failure. He should be provided a staff of qualified electricians to implement the plan. If qualified people are not available in-house, consider hiring a qualified maintenance contractor to be responsible for the maintenance and testing. Regardless, the in-house leader is essential to the success of the program due to this individual's knowledge of the system.

Once the staff is in place, develop a program that identifies all the specific components of the electrical system, establishes a priority based on the critical nature of the equipment and settles on the exact scope of the work to be done and frequency of its performance. Items which are most critical to the operation of your facility, such as emergency generators or fire alarm systems, will require the most frequent inspections and tests. Factors such as the physical condition, operating parameters and equipment environment will also need to be considered. Manufacturers' recommendations will give you the suggested testing requirements and the frequency of inspection. These recommendations are based on standard operating conditions so your plan should reflect your specific site conditions.

With your program in place, it's time to do the work. Some maintenance tasks require the equipment to be energized, but whenever possible perform the maintenance and testing with the equipment de-energized. Coordinate any shutdown with the building occupants. Some of the shutdowns may require scheduling work for off hours between midnight and 6 a.m. or weekends or transferring loads from the normal power system to emergency power. These factors should be considered as a part of your program development.

NFPA 70B gives you an overview of the items to consider for attention and some general information on what to look for during your inspection. While the list is not exhaustive, it does provide you with a valuable starting point for doing your inspection and testing. Do not forget the connective elements of your system, like the bus duct from the main switchboard to a motor control center in the central plant or the conductors from the critical distribution panel to an isolation panel in the OR suite. These can be overlooked, but they are critical to the effective operation of your facility.

Once you have completed your inspection and testing, you can determine what corrective actions are required. It may be as simple as doing a little "spring cleaning." On the other hand, you may discover a major disaster waiting to happen. Either way, you can act rather than react by

scheduling a shutdown to take corrective action and alleviate the need to operate in crisis mode. Resources can be scheduled and occupants of the facility can be notified of the shutdown and take appropriate actions. Technical data can be assembled and reviewed while replacement parts needed to make repairs are gathered without paying those rush shipping charges.

Finally, records need to be kept to allow evaluation of results. Examination of the records will assist management in planning what future budget allocations for EPM and emergency repairs. Records will also assist in the evaluation of EPM parameters. Are your inspection frequencies correct and is the staffing sufficient for the magnitude of the work? Do you have the correct replacement parts in sufficient quantities? Were there any unusual events that you had not accounted for? Thorough record keeping will help you in answering these questions. With proper analysis, you can plan the next cycle of inspections and tests to better meet the needs of your facility. Also, update your EPM when changes are made to your electrical system by adding new equipment to the maintenance schedules and updating spare parts inventories.

One consideration for those who are presently involved in or planning an expansion is the importance of an EPM in the electrical system design. Has sufficient thought been given to servicing the electrical components in the electrical system? What happens if a critical element in the electrical system fails? Are there sufficient safeguards designed into the system to allow you to continue to function while that element is being repaired or replaced? Now is the time to think about these things - not when a failure has happened and it's too late. The old adage, "Plan your work and work your plan," is never any truer than it is here.

In summary, if you are responsible for a facility that does not have an EPM it is not too late to start one now. Begin to consider what it will take to develop your program and start working on it. Ben Franklin reminds us that we should "never put off till tomorrow that which you can do today."

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