A Renewed Focus on Electrical System Maintenance

Of course, everyone knows NFPA 70B has been a standard now for two years running! Unless maybe you reside outside of the continental US. Why does it matter? When the lights go out and power is gone, then everyone cares! At the Electrical Safety and Reliability Association we are passionate about electrical system safety and uptime.

Data Centers cannot provide their primary mission without power and neither can any industry. Anyone who owns an automobile knows that if you don't maintain it, in a matter of time it will cease to function. Electrical equipment is usually located out-of-sight, somewhere behind the facility. Folks know it exists but take it for granted. I did this for 25 years in manufacturing, until there was a problem, i.e.: utility power outage, blown fuses in the substation, etc.

Plant Services is a great magazine that has the pulse of all things related to Maintenance and Reliability. In April they conducted a 2025 electrical safety survey revealing top risks for manufacturing facilities. Safety should always be the main reason for properly maintaining electrical, or any equipment. Great resources on this issue are the Electrical Safety Foundation International, and of course, the Electrical Safety and Reliability Association.

Knowing the necessity of power in a Data Center, NFPA 70B, IEEE standards and ANSI/NETA MTS were consulted to develop a robust electrical maintenance plan. I would urge each plant manager to ensure there is a written Electrical Maintenance Plan (EMP) as required by NFPA 70B. Between the forementioned sources, there are a whole host of requirements and recommendations. Performing all of them is probably cost prohibitive. Performing none of them will tend towards a disaster someday. Meeting in the middle is best by evaluating potential failures, analyzing actual failures and balancing the risk and impact on the facility to complete the maintenance.

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I am a strong advocate of consulting with the folks in the field performing the work, whether be it creating a preventative maintenance task plan, or setting standards for any maintenance work. They know what work is value-added and what is really just not necessary. The goal is to perform the tasks that will prevent failures, reveal the real condition of the equipment and properly maintain it.

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Below is a list of electrical system failures I have experienced that maybe you can relate to:

1. Arc flash from medium voltage transformer due to poor installation.
2. DGA results from a high voltage transformer of >50,000 ppm of Hydrogen.
3. $6000 penalty on the monthly utility bill for low power factor.
4. High fifth harmonic creating control issues in the plant due to many VFDs.
5. Loss of electronic equipment from lightning strikes or utility surges.
6. High voltage fuse clears and you actually have a spare (10 years old).

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How about the hidden failures found by various methods of testing?

1. IR scanning revealing one phase significantly higher on the medium voltage supply.
2. Finding a cracked bushing, or low oil level in the high voltage substation.
3. DGA results of high acetylene revealing partial discharge.
4. High resistance readings of fuses, surge arrestors, insulators, etc.
5. Potential readings on grounding system reveals high or infinite resistance.

Performing an FMEA on your high-risk electrical gear where a loss could result in an outage is highly recommended. These include transformers, switchgear, cables, circuit breakers, switches - mostly high or medium voltage. Don't forget about other devices out-of-sight and out-of-mind like batteries, ex: substation batteries, fire alarm panels, security system, MV switchgear, emergency and exit lights.

Other aspects of a robust EMP are end-of-life strategies, obsolescence planning and cybersecurity for electronic devices. Developing a re-energization plan after a utility outage will help forge some of the necessary plans.

Electrical equipment should be considered highly critical and receive the appropriate level of attention, maybe more than production equipment. Let's keep those lights ON!

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