SOLUTIONS

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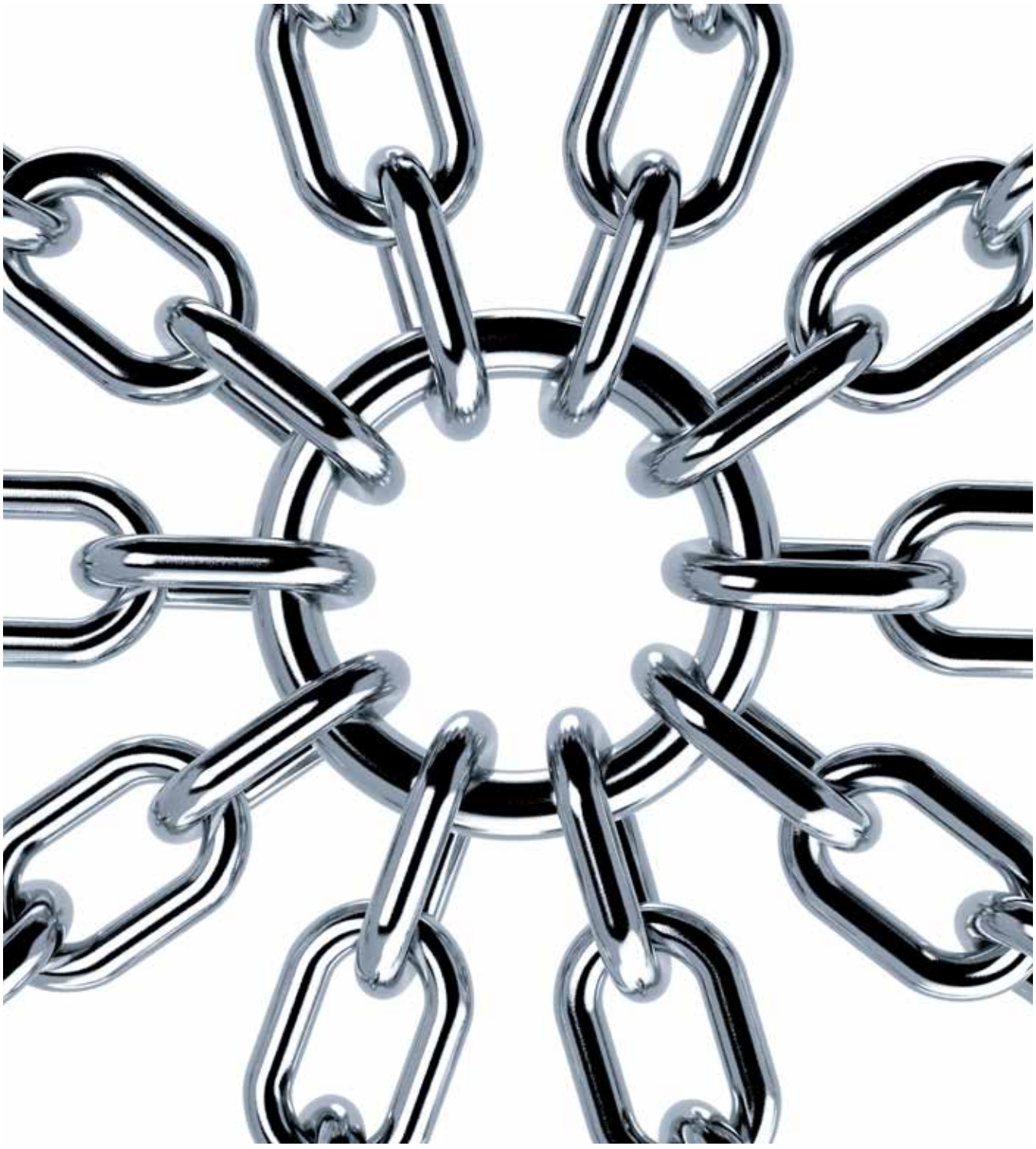

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FROM THE CHAIR

Expansion and Growth is Great. Reliability is Even Better

For those of us in the northern hemisphere, summer is in full swing. Many of us will vacation and spend time with family and friends. I personally will be going on a weeklong bicycling ride with the Register's Annual Great Bicycle Ride Across Iowa. With that kind of trip, preparation, along with having dedicated support team, are the keys to success. Without the proper preparation and dedicated support, the trip wouldn't be successful (or comfortable).

I mention this because most of our companies have built or are working on an existing plan to ensure reliability success. It's up to us to support those reliability programs to ensure the right care is given to our assets. The right level of support is necessary for our assets' sustainability and ability to have a positive return on net assets (RONA). The member-submitted articles in this issue focus on practical applications of best practices that provide the path to success. Adhering to and supporting best practices is one of the best ways to support your reliability program and gain buy-in from other departments and managers.

In a recent op-ed article, Chicago's mayor talks about his focus on improving the city's mass transit system through maintaining the existing rail system rather than expanding it. This is a great example of how supporting a reliability program can yield positive results for your assets and your customers while not necessarily "wowing" anyone through growth. While in Manchester, England, for the Institute of Asset Management (IAM) Conference, I listened to a speech by Dr. Jon Lamonte from Transport for Greater Manchester. He advocated for the same type of focus on maintaining current assets at a high level rather than replacing them with new assets and/or expanding beyond the means of our ability to properly support and maintain. Both are great examples of how supporting a good reliability program for your assets is important not only to the sustainability of company assets but also to our customers and consumers.

As a part of our long-term strategy this year, SMRP is working with several organizations, including the IAM and the Plant Engineering and Maintenance Association of Canada (PEMAC), to create mutual agreements and partnerships that provide more opportunities for members. Each agreement enlarges the scope of opportunity for members to receive additional value out of their SMRP membership, as well as to provide a more robust and global perspective to those learnings. These will serve as a catalyst for members of all three organizations to broaden learning opportunities, increase networking and provide access to new practices and knowledge.

Speaking of best practices and increasing knowledge and networking, the 25th Annual SMRP Conference is fast approaching. Registration is open; it's now time to book your travel and choose your workshops, tours and track sessions. As Benjamin Franklin said, "failing to prepare is preparing to fail." Be proactive. Prepare to succeed by registering today. Supporting your reliability program starts with you. And don't forget, there is another way to advance that knowledge: Bring a college with you. I hope to see you and your colleagues in Kansas City this October!

Larry Hoing, CMRP, CMRT,
SMRP Chair

Do Factories Still Need ‘Maintenance’ Departments?

By Bob Argyle, Chief Customer Officer at Leading2Lean

We hear a lot of talk about “lean maintenance.” This talk ignores a different conversation that could be taking place. This new conversation starts with the question: Why does the maintenance department even exist?

The term *maintenance* implies maintaining things the way they’ve been, sometimes for decades. In today’s competitive marketplace, only *maintaining* inevitably leads to a company’s demise. Why then should we have a department dedicated to just maintaining machines and processes?

In my experience, 90 percent of factories operate with systems and methods that are outdated. Antiquated, actually. These are systems that do not support continuous improvement and are in fact wasteful and don’t add value. For the people on the plant floor, these systems are viewed as more of a task than a valuable tool. For manufactures to stay competitive in the rapidly changing marketplace, they need to let go of these outdated methods and embrace the future.

Imagine factory workers utilizing mobile technology to instantly share ideas and have visibility of current conditions and past history. What if maintenance technicians were wearing Google Glass while troubleshooting problems? We live in a time when cars are starting to drive themselves, yet plants are still using pen and paper and solutions that were developed more than 20 years ago to track activities.

Maintenance as an Engine of Continuous Improvement

Sure, there will always be people who complete the functions of repairing equipment, but in the future, their department will be called something else because they’ll be tasked with doing less *maintaining* and more *improving* of activities. Some people refer to it as “lean maintenance.” “Lean manufacturing” is a better description because in reality, maintenance and production are inseparable.

In factories that have a true lean culture, maintenance sees itself as an engine of continuous improvement, and management empowers them to do so.

Think of the National Association for Stock Car Auto Racing, or NASCAR for those of you unfamiliar with it. The uniformed pit crew is front-and-center near the track. They are part of the race, and their job is to coordinate as a team to help the driver finish the race as fast as possible. To do so, they take into account mileage, tire wear and a host of other factors to work as little and as fast as possible when they need to – all while making decisions on the fly by constantly monitoring information.

What if factories treated their maintenance people the same way? By putting the maintenance team font-and-center and empowering technicians to immediately suggest improvements based on real-time data, velocity and productivity will increase.

By putting the maintenance team font-and-center and empowering technicians to immediately suggest improvements based on real-time data, velocity and productivity will increase.

Unfortunately, in most factories the maintenance department is tucked away in the back. It's dirty and oily, and the manager doesn't feel like they are a part of the operations team. Morning meetings usually become a finger-pointing exercise – with the finger usually pointed at maintenance.

If this is to change, the mentality around maintenance must evolve.

"Moneyball" on the Factory Floor

Technology is allowing more manufacturers to see data in real-time in a way that identifies the biggest problems. Not having real-time data is a lot like coaching a baseball game without being present. You just can't gather enough information to see a clear picture and make adjustments in the moment.

Analysis of real-time data helps guide further improvement after the fact. Think "Moneyball" on the factory floor. Just as Billy Beane, general manager of the Oakland Athletics, used analytics to more accurately identify good traits in previously undervalued baseball players, real-time data on the factory floor gives technicians and engineers immediate feedback on what needs to be changed or fixed. This empowers maintenance departments to be one of the main drivers of improvement.

I personally observed a government contractor on the East Coast implement a technology system that allowed everyone—floor workers and executives—to see tracking data, align goals between departments and identify repetitive downtime issues. A few months later the maintenance technicians were presenting solutions they had developed for problems no one even previously knew existed, or even worse, were viewed as normal, to the vice president of operations. One machine was eating up nearly half an hour of downtime each day with needed repairs. Data allowed maintenance technicians to discover they could decrease needed repairs down to half an hour a month.

Over the longer term, this access to useful, real-time data empowered workers on the plant floor to continue to drive improvements. After one year, the factory was able to produce 20 percent more product with significantly fewer resources. Additionally, over the following three years they increased operational availability by 15 percent, improved preventative maintenance compliance with the government from 65 percent to 100 percent, and reduced equipment downtime by 50 percent.

The factory maintenance supervisor said, "I finally got my life back." He no longer spent every day—plus nights and weekends—receiving calls and texts about problems.

Not only did the factory enhance bottom-line results and make things easier for managers, maintenance technicians were empowered to improve things rather than to make the same adjustments and repairs to machines. No doubt technicians were going home to their families and saying, "I solved a problem at work today," and "they're not just asking me to fix something over and over every day, they're actually asking me to use my mind. They're open to my suggestions, and they've implemented my ideas." This makes people feel more valuable and motivates them to want to solve more problems and improve more processes.

Sadly, a lot of companies overlook the value of ideas from employees on the factory floor.

Continuous Improvement Brings More Work and Adds Jobs

The way to keep factories from shrinking, having to move operations or even closing is to show that those factories are keeping up with the global economy and that they're more effective today than they were yesterday. Real-time data with technology is leading to improved bottom-line results and takes emotion and territorial disagreements out of discussions on improvement.

Some people fear the loss of jobs with onboarding new technology. In my experience, it's been the opposite. You save jobs because you ensure the plant will continue to exist. By incorporating continuous improvement across the entire factory, I've seen plants become more efficient. With more work coming to the plant, it actually led to hiring people. I've also seen companies refuse to reduce technician headcount because they could see that they were driving improvement, resulting in bottom-line savings for the company.

A technology-based tool provides instant access to information about what's going on, what's happened in the past and what they need to do to solve the problem. It also creates a more cohesive community environment where employees can easily share information and ideas on how to fix problems.

I'm looking forward to the day when the term "maintenance" doesn't exist in a manufacturing facility.

Essentially, that day is here—in successful factories.

if factory owners keep on maintaining things and ignore the use of technology—which is improving systems in all kinds of industries—and remain complacent, they will be challenged by more agile competitors.

Reliability Centered Maintenance:

A Cornerstone to Electrical Safety

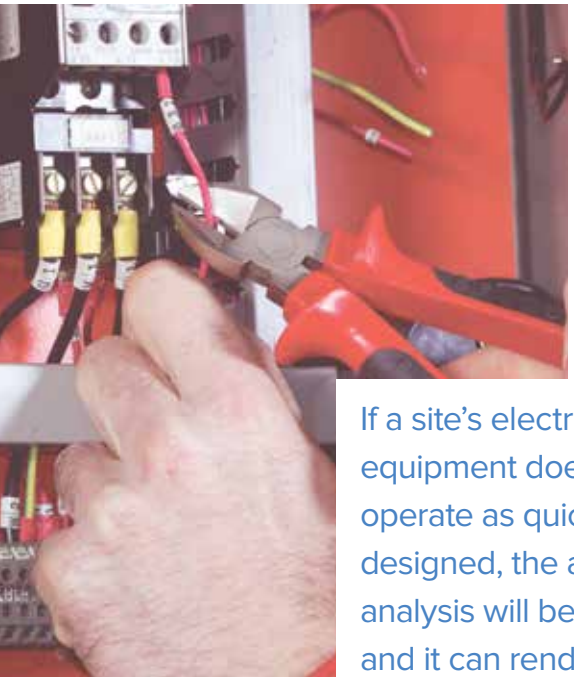
By Tommy Northcott, PE, CMRP, Senior Power Engineer with Jacobs

As the probability of equipment failure increases, the probability of injury or death of electrical workers associated with that equipment failure increases proportionally.

Introduction

Electrical work tasks share many of the common hazards found in most industrial trades. These include slips, trips, falls, pinch points, mechanical forces and high temperatures, among others. However, there are some hazards that are unique to electrical systems. The three general hazards associated specifically with electrical energy are **shock, fire** ignition, and **arc flash and blast.** These three hazards have the potential to be life-threatening for electrical workers as well as non-electrical workers. Thankfully, there are mitigation techniques that can be incorporated to prevent death or even injury from these electrical hazards. A mature reliability centered maintenance (RCM) program greatly reduces the probability of these hazards being present to employees and will contain aspects that protect employees that are exposed to such hazards.

Statistically, there is a small percentage of non-electrical worker injuries and fatalities related to electrical hazards. However, the majority of electrical-related injuries and fatalities result from electrical workers operating and maintaining electrical equipment. With little exception, the statistical data can be combined into two broad categories – equipment failure and unsafe maintenance practices. As the probability of equipment failure increases, the probability of injury or death of electrical workers associated with that equipment failure increases proportionally. Measures taken to decrease the probability of equipment failure will also decrease the probability of personnel injury or death. Therefore, taking care to maintain electrical equipment in good health is an important part of caring for the safety of the personnel who work on or around that same equipment.



If a site's electrical equipment does not operate as quickly as designed, the arc flash analysis will be invalid and it can render the best electrical safety program, training and PPE useless.

The second law of thermodynamics tells us that the instant electrical equipment is put into service it begins to deteriorate. Deterioration is normal and equipment failure is inevitable. Every piece of electrical equipment, if left to operate indefinitely, will eventually fail in some fashion. Outside influences, like environmental conditions, overloading, duty cycles, human interaction and configuration changes in the connected circuit can expedite this normal deterioration. Equipment failure can be delayed through the application of an Effective Electrical Equipment Maintenance Program (E3MP). Without an E3MP, the owner of the equipment assumes a greater risk of a serious electrical failure and any additional hazards associated with such a failure. A growing understanding of this risk and associated hazard is a main driver to the National Fire Protection Association (NFPA) 70E committee continuing to incorporate maintenance considerations into its standard for electrical safety in the workplace.

E^{3}MP and its Effects

When performed correctly, an E^{3}MP will increase the life of the electrical equipment, reduce the overall equipment life cycle cost, minimize unplanned outages and reduce the probability of personnel injury related to the operation and maintenance of the associated equipment. The benefits of an E^{3}MP are both direct (measurable, such as reduced downtime) and indirect (less measurable, such as improved safety). Reducing the cost of repairs and downtime over the operational life of the equipment are examples of direct benefits that can be easily measured and in most cases are given a calculated economic value. Indirect benefits are not as explicitly obvious and are often times difficult to quantify. An example of this is a reduced probability of significant arc flash events. Arc flash energy is dependent upon the available fault current and the time it takes to clear the fault. Overcurrent protective devices (OCPD) and breakers determine the time it takes to clear a fault. Therefore, if these devices are not properly maintained and are unable to clear the fault as designed, the arc fault duration increases. This allows the fault energy magnitude to increase, resulting to an increased probability for injury or death during a fault condition. Keeping these devices properly maintained is an example of an indirect benefit to the safety of the employees who depend on correct arc flash energy calculations to determine appropriate personal protective equipment (PPE) to keep them protected.

The most common method for calculating the incident energy level in order to determine the necessary level of arc flash PPE is to use one of the software products on the market that performs the calculations based on system data input. The data input into the software comes from walk-down evaluations and system documentation that in essence recreate the electrical system as a model in the software. This allows it to calculate incident energy and enables the printing of warning labels with PPE requirements. Typically, these software programs assume proper operation of all devices in the system and do not consider maintenance frequency, procedures or methodology. When an OCPD is not properly maintained and opens slower than designed, the result is an increased incident energy at the point of the fault. If the equipment is not properly maintained, it is reasonable to assume that the calculations from these software packages will be inaccurate and will typically result in requiring lower levels of arc flash PPE than what would really be needed when the upstream protective device does not operate as quickly as designed. If a site's electrical equipment does not operate as quickly as designed, the arc flash analysis will be invalid and it can render the best electrical safety program, training and PPE useless. It quickly becomes clear that there is no way to completely meet the Occupational Safety and Health Administration (OSHA)'s requirement for providing a safe work place without having an E3MP.

There are two primary categories that one can group maintenance into – reactive maintenance and proactive maintenance. Reactive maintenance methodology is one of using a system until a part fails and then performing corrective maintenance to restore it to its intended functionality. Reactive maintenance is simple to implement because an organization simply waits until a failure occurs and then responds to the failure appropriately. However, if this failure occurs on a critical system it could result in costly downtime and repairs. Even worse, if it fails on an electrical system and results in an arc flash, it could cause injury or death as well as collateral damage to nearby equipment. While reactive maintenance is not be a preferred

approach for critical equipment or equipment that contains high energy sources, it may still be a reasonable approach for less critical equipment that does not pose a safety hazard.

Proactive maintenance is a completely different approach that has many different options within its broad category of maintenance. In general, this approach utilizes different techniques with the objective of performing maintenance before any failures occur in order to keep the system healthy and fully functional. This approach has the clear benefit of decreasing the probability of unplanned outages that are a result of part failures. RCM practices include a proactive maintenance approach that is distinctly focused on ensuring the system functions as designed within the operating environment to which it's exposed. It should be noted that an RCM analysis may result in choosing a reactive maintenance approach when determined to be appropriate based on the equipment's criticality and function.

RCM and Electrical Safety

RCM is an approach to equipment maintenance that determines the most technically correct and cost effective method for maintaining a maximum functionality life of a system or equipment. In general, the RCM process includes evaluating system criticality, failure modes, failure mode impact and severity, and then determining appropriate maintenance techniques that prevent or identify failure modes before a part fails. The RCM process then uses this data to determine the appropriate maintenance strategy to deploy on the system. A system can be designed to be extremely dependable. However, if that system is not properly maintained, over time it will lose its dependability due to the Second Law of Thermodynamics as previously mentioned. It is the objective of an effective RCM program to find the correct balance of preventive maintenance (PM) tasks that will detect when the dependability begins to decrease and then plan appropriate steps to maintain the inherent reliability of the system's functionality.

When it comes to electrical equipment, reliable operation of the equipment is directly related to electrical safety. For electrical operation and maintenance personnel, the two main electrical hazards are shock and arc flash. For electrical operations, it's assumed that equipment is operated with all conductors enclosed or insulated – and not exposed to the worker. In this case, the shock hazard is eliminated and arc flash becomes the only potential electrical hazard. For operational tasks, an arc flash would only occur if the electrical equipment has a failure resulting in a phase-phase and/or phase-ground fault. If the RCM process correctly identifies and mitigates the failure modes for the equipment, the result is a lower probability for an arc flash event to occur and a safer operating environment for the electrical worker.

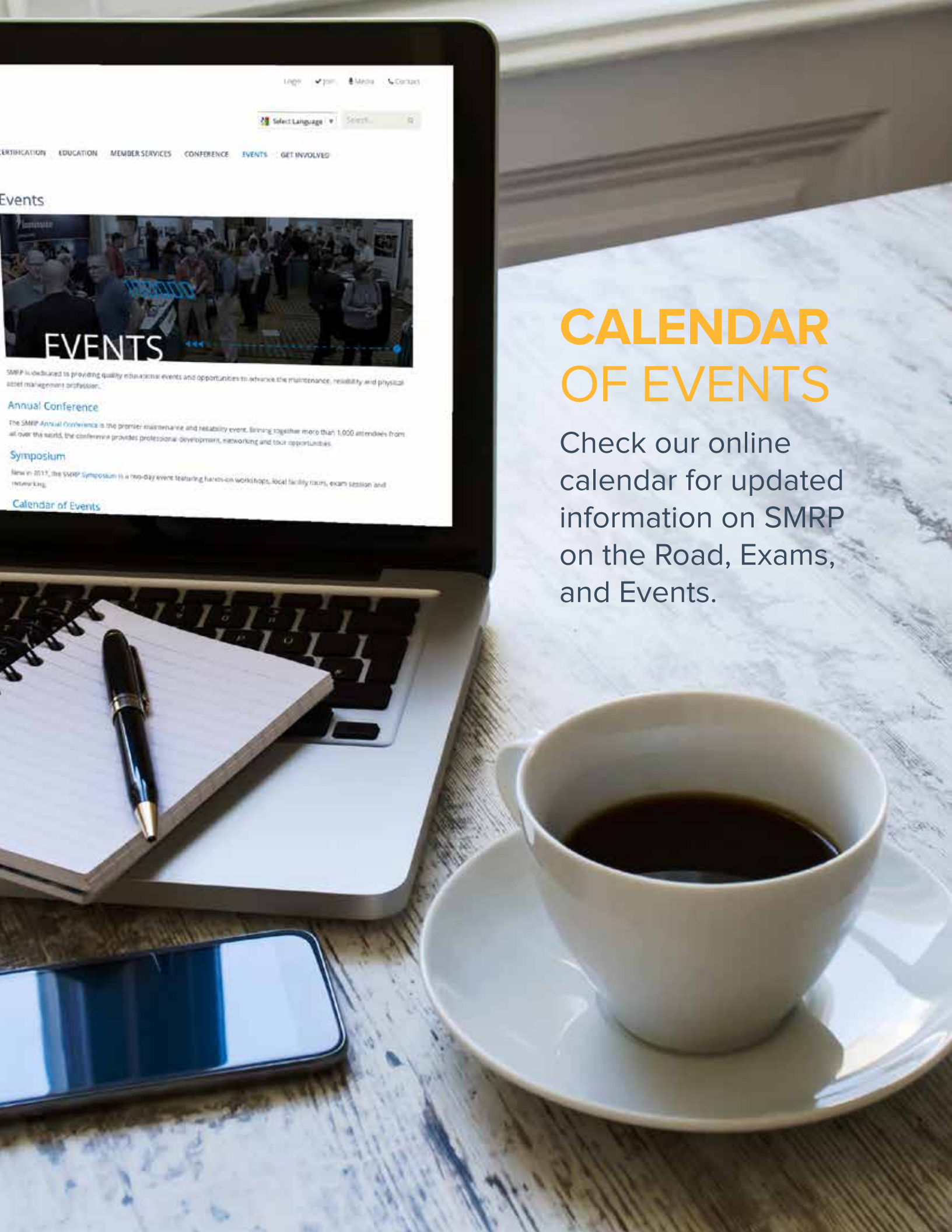
Electrical maintenance tasks have a significant impact on personnel safety. One of the most common causes of electrical injuries and fatalities is some level of human error. It stands to reason that simply minimizing human interaction with a piece of electrical equipment will decrease the probability of personnel injury during the electrical equipment's operational life. Utilizing RCM techniques in the overall E^{3}MP will result in minimizing PM tasks that require human interaction with equipment. Traditionally, electrical distribution equipment has been removed from service, disassembled, cleaned, inspected, re-assembled and returned to service on some calendar frequency per manufacturer or industry standard, regardless of whether or not the dependability of that device is decreasing at any rate. Many people do not realize that the act of disassembling and re-assembling any device effectively resets the failure curve for that equipment and puts it back at risk of infant mortality. For electrical equipment, this equates to increasing the probability of injury or death as a result of safety hazards related to electrical system failures. This traditional approach to electrical maintenance also induces the risk of personnel being exposed to hazards from unexpected back feeds, arc flash events caused from improper enclosure removal, inadvertently leaving tools or protective grounds on conductors and a myriad of other human errors that pose a hazard to equipment and personnel. A properly developed RCM program utilizes PM technologies such as infrared scanning, ultrasound monitoring, electrical testing, partial discharge trending, oil analysis and other appropriate options to trend the health of the equipment in order to only execute PM when the data indicates it's needed. The E^{3}MP also includes an evaluation of PM tasks to ensure personnel are only performing steps that will prevent likely failure modes. These actions minimize the frequency of personnel involvement in predictive maintenance (PdM) process as well as eliminate steps not addressing any likely failure mode that may return the device to the infant mortality area of the bathtub curve.

Two key aspects of developing an E^{3}MP while incorporating RCM methods are performing equipment criticality analysis along with optimizing the proactive maintenance program such that each step addresses the prevention or early detection of a likely failure mod. Understanding an electrical equipment's role in a system is vital to determining the appropriate maintenance strategy. This understanding is commonly referred to as determining the equipment criticality. There are several factors to consider when determining equipment criticality. These include redundancy, mean time to repair, spare parts inventory, collateral damage related to the failure and any number of other variables that are important to the facility. The criticality score will be the driving factor that determines which broad maintenance strategy to utilize, run to failure, time-directed maintenance procedures, and condition-directed maintenance procedures, among others. When it comes to electrical equipment, potential hazards for personnel should be considered and heavily weighed when determining the criticality. Once the criticality has indicated that proactive maintenance is the strategy to be used, the proactive maintenance program must then be evaluated or developed. Over the last several decades, industry has collected copious amounts of data related to electrical equipment failures. An important aspect of developing the maintenance program is first understanding the probable failure modes of the equipment. The maintenance steps must address these failure modes in a manner that it does not add unnecessary potential for inducing a failure through human interaction. PdM technologies should be utilized whenever possible in order to minimize personnel exposure to hazards and determine when additional maintenance is required based on equipment health.

Understanding an electrical equipment's role in a system is vital to determining the appropriate maintenance strategy.

Conclusion

Imagine a reality where there was no need for direct human interaction with electrical equipment and all electrical equipment was designed such that it was impossible for there to be a failure. Would there be any electrical hazards? While this is a seemingly unrealistic scenario, it brings out a very important point. The two basic scenarios that put personnel at risk of injury or death due to electrical hazards is direct interaction with the equipment and equipment failure. If we can develop a reliability-centered E3MP that minimizes the probability of failure and reduces the frequency of direct human interaction, we have effectively increased the safety of our workforce. An ineffective electrical maintenance program not only increases the potential for equipment failures and arc flash events, it may also render several aspects of your electrical safety program ineffective. Electrical safety in your workplace must include an E3MP that has RCM at its core.



CALENDAR OF EVENTS

Check our online calendar for updated information on SMRP on the Road, Exams, and Events.

Plant-Wide Formal Work Prioritization

By Mike Johnston, CMRP,
Senior Consultant T.A.
Cook Consultants, Inc.

Everyone has a different idea when it comes to what constitutes a work priority. To arrange all tasks in order of their relative importance is difficult to do without letting personal opinions get in the way. In maintenance, a priority must be delineated and assigned vis-a-vis a defined protocol, not based on an individual desire, designation or assumption. At too many manufacturing sites, the task of work prioritization is left to those who request a specific corrective action be undertaken to address a particular deficiency. Routinely, these are based on an emotional priority rather than an objective judgement because the site may not have a formal process in place to ensure all prioritization utilizes the same evaluation criteria. That, or the enforcement is lax. When it comes to determining one task's urgency over another, is it really all relative? Hardly.

How then do we review and summarize the content and relevant actions needed to implement, or perhaps enhance, a formal prioritization process throughout a site and across all departments and disciplines?

The Work Request

Work request generation procedures vary greatly from site to site. At some, anyone can initiate a work request. Other facilities stipulate that requests must be channeled through the operations or maintenance department. Once the request has been generated and submitted, it is reviewed and approved. Yet again, each facility may have its own protocol for approval. It may be passed to the lead planner or routed to a maintenance coordinator; they may be directed to the maintenance

superintendent or the operations manager. In whatever manner or means these requests find their way into the system, they need to be measured and weighed against a common set of criteria and be consistently applied. Establishing a checkpoint or prioritization gate will help weed out personal opinions and increase consistency.

Initially, the best way to review and approve work requests is through short, daily morning meetings with all stakeholders. In this setting, management can evaluate the proposals on a 24-hour cycle based on factors they deem applicable and distinguish between the indispensable and the merely desirable. Substandard requests must be returned to the employee from whom it came until they are able to provide the appropriate details for work definition. Stakeholders should never alter the work description themselves or contact the requestor for additional information or they will reinforce the process of sloppy documentation.

What constitutes proper notifications criteria should be documented, known site-wide and rigorously enforced. When submitted, each request should already include a suggested priority level. Many requestors believe that the problems affecting them or their area should take precedence over all other tasks, regardless of the backlog. At the morning meetings, the priority level should be reviewed, determined, altered (if needed) and agreed upon by the stakeholders. The content of the notification and description of the requested work is examined to ensure adequate understanding and explanation of what needs to be done. Deficient and vague descriptions, such as “pump is not working properly” or “gauge doesn’t read right,” are insufficient to determine the severity or complexity of the issue.

Finally, the work notification is either converted into a work order (WO) or dismissed. If processed, it enters the backlog, according to the assigned priority, to await planning and scheduling. A meeting agenda should lay out the objectives and steps for a daily notification review meeting, as seen in **Figure 1.** Initially, the meeting may consume more than the allotted 15 minutes, but once the participants become familiar with their roles and expectations, it will become easier and eventually unnecessary. The review meeting is an interim activity, albeit an absolutely

Figure 1

Daily Morning Notification Review Meeting

Frequency	Daily
Day	Mon. - Fri.
Time	7:30
Location	Maint. Conf Rm
Duration	15 minutes

Attendees

- Operations Manager
- Maintenance Manager
- Operations Superintendents
- I&E Superintendents
- Maintenance Superintendent

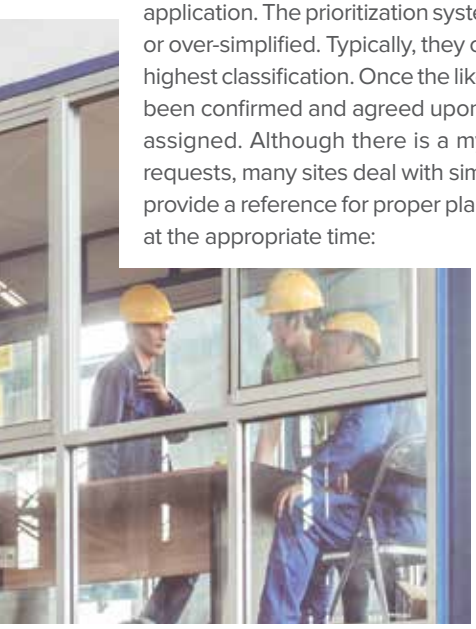
Objectives	Agenda	Minutes
• Set and agree the Priority for new notifications • Ensure the quality of new notifications • Turn notification into work order with proper planning revisions code.	**Review all new notifications:** • Ensure the notifications describes the work adequately • Review the priority set on the notification agree or adjust as required • Change to work order and assign revision code for planning.	5 5 5 **Total** 15

Meeting support documents	Meeting Outputs
• SAP variant which displays notifications	• Well defined work orders with correct priority and revision code

essential one when a site tries to train or establish compliance to an existing priority system. After time, when everyone knows, understands and complies with the established WO priority system, there is no need for the meetings to continue.

Sample Prioritization Codes

Many sites already employ tools to assist in prioritization, such as the matrix in **Figure 2.** This mechanism assists in determining the importance of work and removes any conflicting opinions that may have been expressed in the daily review meeting. It doesn't matter if a site decides to label their priority codes as **1, 2, 3, 4** and **5**, or as **A, B, C, D** and **E**, or some other configuration—what does matter is consistency in their understanding, enforcement and application. The prioritization system should not be overly complex or over-simplified. Typically, they consist of five levels, with 1 as the highest classification. Once the likelihood and consequences have been confirmed and agreed upon, the appropriate priority can be assigned. Although there is a myriad of different types of work requests, many sites deal with similar issues. The follow examples provide a reference for proper planning, scheduling and execution at the appropriate time:



Priority 1 – Emergency/Break-in

Priority 1 jobs are designated as those that must start immediately, without prior planning or scheduling, and continue until the emergency situation is resolved, or the equipment is online and operational. Break-in level tasks pose either an immediate threat to personal health and/or safety or could result in major damage to buildings, equipment or other property. In this situation, overtime would be approved as required. The following are a few examples of work that would be classified as Priority 1:

- A safety hazard exists and temporary precautions cannot be taken or would be ineffective.
- An environmental or EPA-reportable exceedance has occurred, or is highly probable, and cannot be controlled within limits.
- A production unit is down or serious production interruptions are eminent and quality could be hindered.
- Safety Critical Equipment requires attention.

Figure 2.

			POTENTIAL CONSEQUENCES				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measurable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	Minor	Moderate	Major	Severe
LIKELIHOOD	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	high	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	HIgh
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

Despite a requestor's fervent belief that their need is paramount, most work notifications cannot be classified as Priority 1. Spared or redundant equipment should seldom, if ever, be assigned this emergency classification. Unfortunately, sometimes the requestor may only think in terms of a specific area and fail to prioritize from the perspective of the entire site. Another case of incorrect Priority 1 classification would be if an operator assigns the highest priority to a request because a unit was operating on one of two pumps. Although the spare pump, in this case, was functioning properly and at design capacity, the operator felt this was an emergency because the unit was down to one pump, with no spare. In this case, the request should be reassigned to Priority 3 (see below). Simply assigning the highest priority in a bid to get the work accomplished quickly without evidence to substantiate the claim is unacceptable and the task must be reassigned.

Priority 2 – Urgent/Critical

Priority 2 jobs should be planned, scheduled and ready to execute within a week. A definitive end-date should be included in the work notification. Depending on the severity of the situation, parts may be expedited and overtime could be authorized. Incidents that would qualify as urgent include:

- A safety hazard exists and temporary precautions have been taken.
- An environmental exceedance has occurred, or is highly probable, but can be temporarily controlled within limits.
- There is a possible loss of production or potential equipment breakdown.
- A unit is operating on spare equipment where the backup is not functioning at a satisfactory capacity to meet production demands.

These are issues that, if left unaddressed, can quickly escalate into emergency situations or equipment malfunction. Failure to mitigate a potential environmental issue may escalate into an incident that further impacts the facility and surrounding area.

Priority 3 - High

Priority 3 jobs should be planned, scheduled and ready to be carried out within 14 days. Examples of a "high" work request classification include:

- The safety risk is minimal and appropriate precautions can, or have been, taken.
- An environmental condition could exist but does not currently exceed tolerable limits.
- A condition exists that could eventually result in an adverse effect to production or quality.
- A case in which a unit is running on spare equipment and the spare is functioning properly at design levels.

Failure to mitigate a potential environmental issue may escalate into an incident that further impacts the facility and surrounding area.

Priority 4 – Routine Preventive and Corrective Work

Routine jobs should be planned, scheduled and ready within two to four weeks. This includes normal preventive maintenance (PM) and routine repair activities such as:

- A deficiency with minimal or no safety risks and no precautions are needed to mitigate.
- No environmental condition exists.
- Although the equipment may or may not be critical to production, the spare reliability is very high.

These are the ordinary, planned repair work tasks and scheduled PM activities that include standard cleaning, lubrication routes and predictive/condition-based maintenance (CBM) functions. Ideally, this is where at least 65 percent of maintenance pursuits are directed. These are the actions performed to ensure the Priorities 1, 2 and 3 are minimized to a nuisance level.

Priority 5 – Project/Shutdown

Priority 5 jobs are planned and scheduled as resources allow. Shutdowns, (MOCs) and capital/project work would fall into this category. In many facilities, project and shutdown work is planned, scheduled and executed by a separate, third-party workforce. This work is usually not considered for day-to-day site maintenance activities.

Implementation

Changes cannot be conducted in a vacuum. If a site has no formal prioritization process in place and institutes one, or even if there are just updates and alterations to the existing procedures, staff will require training on the classifications, expectations, rules and enforcement. To help with the training process, physical handouts, electronic training aids and classroom sessions with an emphasis on what constitutes proper work request descriptions will help stress the importance of following the prioritization classifications criteria and creating clear work requests.

Follow-up practices will also help make sure all the new procedures are followed. Reviewing the existing backlog will help determine if any work should be reclassified or done more regularly. Maintaining a clean and up-to-date backlog is imperative; regularly scheduled assessments of aging work should also be part of the site's meeting cadence. The daily notification review meeting is the quickest and most efficient way to ascertain the staff's adherence to work descriptions and prioritization classification rules. If such a meeting isn't already established at a site, it should be implemented as soon as the training is conducted.

Knowing what work to do and when is a fundamental aspect of maintenance. Setting the proper work prioritization is the first step to creating an accurate and ideal work flow. Prioritization feeds all other subsequent activities of planning, proper resource allocation, parts and material acquisition, scheduling, execution and backlog management. Without such a system, a site will stagger from crisis to crisis and never have the wherewithal to get out from under an overwhelming workload and a bloated backlog. The potential for a catastrophic incident involving negative local or national media exposure is real.

So – what's your priority?

GOVERNMENT RELATIONS UPDATE

The 25th SMRP Annual Conference promises to be an exciting event this October. As part of the educational offerings at the conference, SMRP's government relations team will host several advanced learning and panel sessions that highlight the key issues affecting maintenance, reliability and physical asset management practitioners and professionals today. See below for information about each session and be sure to register for the conference so you don't miss them!

- **Panel Session** Examining the Skilled Trades Gap, Workforce Development and the Economy

  This panel discussion, moderated by SMRP Chair Larry Hoing, focuses on the industry's reliance on the ability for the U.S. to produce highly-skilled workers. As the country and the globe have experienced changes in technology, globalization and educational focus that are in direct contradiction to building technical skills, there is now a shortage of skilled workers. This panel will address how prioritizing career, technical and higher education will create the needed pipeline of skilled trades to feed the economy with a more sustainable standard of living and a more forward-thinking economy.

  Panelists include: Christer Idhammar, Founder and CEO, IDCON, Inc.; Wayne A Pilliner, CMRP, Manager of Maintenance Services, Mosaic; Mary Owens, Program Manager, Polk State College; Robert H. Chalker, Chief Executive Officer, NACE International Institute

- **Panel Session** Marking Smart Things Less Dumb: IoT Security and Policy

  In this panel discussion, Dr. Allan Friedman, director of Cybersecurity at National Telecommunications and Information Administration at the U.S. Department of Commerce.

- **Advanced Learning Session** Heat Exchangers: Nirvana of Efficiency and Reliability

  James Neale, CMRP, of the Engineering Energy Research Center at the University of Waikato, explores how heat exchangers are employed in industrial applications. The presentation includes real-world case studies to highlight the do's and don'ts to achieving engineering nirvana of reliable and efficient heat exchanger performance.

- **Advanced Learning Session** Effective Measurement of Manufacturing Process Variables: Finding the Signal Amongst the Noise!

  James Neale, CMRP, looks at specific strategies to capture missing data sets, including appropriate metering technologies and application methods. He provides detailed case studies from a range of industries will be used to highlight the benefits of proper process system measurements and analysis and how this links to improved efficiency and reliability.

Be sure to attend these sessions while you're at the
25th SMRP Annual Conference in Kansas City!

IN THE SPOTLIGHT

NEED HIGH RES IMAGE

IDCON INC Approved Provider Spotlight

IDCON INC is a reliability and maintenance management consulting and training company. We work worldwide with processing and manufacturing plants, mines and mills. Our focus is on the implementation of improvements to all elements of holistic reliability and maintenance management processes for our clients. Our mission is to improve overall reliability and lower manufacturing and maintenance costs for our clients.

One of our core series is to provide onsite and off site training and on the job coaching to improve best practices of reliability and maintenance management. The training and coaching was developed through our 45+ years experience working with clients to implement best practices at their sites.

Why become an Approved Provider?

When SMRP announced their Approved Provider program, we felt our training aligned well with the Body of Knowledge and would assist professionals pursuing the CMRP designation. But it goes further than that for us; we want professionals to understand what best practices are and how to implement them at their organizations.

Course Title	SMRP BoK Pillar	Course Hours
Work Management: Maintenance Planning and Scheduling	Work Management	12
Materials & Spare Parts Management	Work Management	12
Develop and Manage Preventive Maintenance	Equipment Reliability	12
Preventive Maintenance: Essential Care and Inspections Techniques	Equipment Reliability	12
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