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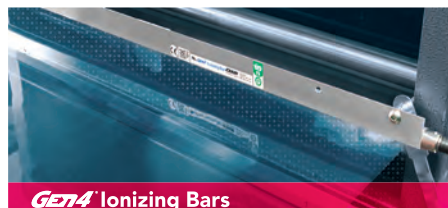
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Table Stakes

When it comes to skills development, is your team holding a winning hand?

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Senior Program Manager, HECO Apollo

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TOM WILK

From the Editor

TEN YEARS AFTER



During a family dinnertime late last year, my 12 year old suddenly turned to the rest of us and asked, "What's your favorite movie??" as if his life depended on it.

My wife went first, thinking about it for a few moments before naming West Side Story. (She and I both know it's really The Warriors, but that's a different column.) Our 10 year old twins hemmed and hawed, naming things like Harry Potter and Percy Jackson. Then it was my turn.

No hesitation: "Woodstock. Full four-hour director's cut."

If you haven't seen it, you're missing out on a simultaneous history lesson and classic rock show. The famous performances like Jimi Hendrix and Sly and the Family Stone are as good as you might have heard, but the real eye opener for me was the last band that appears before intermission: Ten Years After. They turn in an 11-minute original called "I'm Going Home" that starts fast, slows in the middle to weave blues and rock songs together from John Lee Hooker, Carl Perkins, and Jerry Lee Lewis before wrapping up with a fiery close.


Later that night, thinking about that sequence, it occurred to me that 2024 would be my 10th year at the helm of Plant Services. I started reflecting on all the changes in my life since mid-2014, and pretty quickly started thinking about the massive ways that our profession has changed in that time too.

IoT. COVID. ChatGPT. AI. Remote monitoring. The supply chain crisis. Motion amplification. Retirements. Reshoring. I could continue but you get the idea.

All of which has led to this month's cover story, the first article in an occasional series on how the reliability and maintenance world has changed over the past 10 years. For this article, I was curious to find out if people in industry thought that the skill set of the average mechanical millwright had changed much, given how many new technologies have been developed this past decade to assess machine health.

Some respondents expanded the definition of "skill set" in meaningful ways, emphasizing that communication skills were now more important than ever, especially the ability to speak more than one language. Others observed that teams were now expected to synthesize a wide set of skills and technologies to make sense of the machine health data at their specific site.

The full interviews with each expert are posted on www.plantservices.com. I think my favorite response though centered on those plants that do the right thing but for the wrong reasons, such as adopting advanced tools yet using them to do better reactive maintenance instead of proactive work.

It sounds like the way that famous concert took shape 55 years ago. 



Thomas Wilk, Editor in Chief

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SHEILA KENNEDY

Technology Toolbox

CMMS / EAM IMPROVEMENTS KNOW NO BOUNDS

Solutions incorporate new technologies to deliver powerful capabilities and outcomes



For industrial maintenance professionals, an enterprise asset management (EAM) or computerized maintenance management system (CMMS) is an indispensable tool. Providers of the software and complementary solutions are devising new and improved ways to increase usability and functionality.

SOFTWARE MODERNIZATION

EAM/CMMS solutions are routinely upgraded. For instance, the “next generation” of Lumada APM from Hitachi Energy builds on its asset health prediction capabilities with new reliability and optimization modules. This expansion of critical decision support for individual assets or entire asset systems influences the entire Lumada portfolio, composed of asset performance management (APM), EAM, and field service management (FSM).

“Lumada APM – with its health, reliability, and optimization modules – feeds very sophisticated intelligence about asset performance across assets, systems, and portfolios into Lumada EAM. This deep solution interconnection crucially establishes common business workflows and processes that enable greater efficiency,” says Linda Alrabady, global director of product management for APM at Hitachi Energy.

Among the many enhancements included in Maximo Application Suite (MAS) 8.11 from IBM are Operational Dashboard improvements to monitor and manage assets more efficiently. As Maximo’s landing page for EAM needs, persona-based Operational Dashboards provide users with big-picture and granular-level insights and intuitive capabilities, such as monitoring KPIs, tracking workflow assignments,

quickly completing tasks, and accessing other applications.

“The MAS 8.11 update, which includes risk assessment and asset investment planning capabilities, opens up an opportunity for further preventive maintenance of assets, which will ultimately help save time, money, and resources,” explains Kendra DeKeyrel, a vice president at IBM Sustainability Software.

A new AI-powered Maintenance Operations feature set from MaintainX, integrated in its mobile-first CMMS tool of the same name, helps to digitize offline processes, increase front-line workflow efficiency, and prevent unplanned downtime. Specifically, AI is now leveraged in procedure generation, anomaly detection, and the automatic transcription and saving of voice notes.

According to Linda Pham, director of product at MaintainX, “Data is becoming the most important asset for manufacturing and industrial teams. MaintainX AI-powered features unlock the power of data, allowing manufacturers to spend more time on critical work and less time on administrative tasks, significantly increasing productivity.”

Azzier CMMS from Tero Consulting now offers a Power BI Connector. This two-way, real-time integration between the CMMS and Power BI improves maintenance data visualization and analysis and provides actionable insights for optimizing maintenance operations.

“Today’s maintenance professional is able to produce analytics using our Power BI Connector and put them directly on the desktop of the C-suite. They don’t have to ask for them anymore; they live there, directly connected to the maintenance system, giving them a real-time view into the health of their critical assets,” observes Mark Sherling, president and CEO of Tero Consulting.



Sheila Kennedy, CMRP, is a professional freelance writer specializing in industrial and technical topics. She established Additive Communications in 2003 to serve software, technology, and service providers in industry. She can be reached at sheila@addcomm.com or www.linkedin.com/in/kennedysheila.

Data is becoming the most important asset for manufacturing and industrial teams.

[Linda Pham, Director of Product at MaintainX]

SOLUTION EXTENSIONS

Third-party solutions offer maintenance optimization options. The new AI-based Process Intelligence solution from QAD, enabled by its acquisition of Livejourney, provides continuous, unbiased visibility into existing business processes and where they can be improved. It allows users to discover, monitor, and enhance processes with confidence based on predictive modeling.

“Process mining solutions like QAD Process Intelligence enable maintenance cost and productivity improvements in any EAM or CMMS that tracks the flow of maintenance activity,” says Nancy Majure, director of product management at QAD. The company’s solution is differentiated by real-time monitoring for immediate anomaly alerts; unit-level drill-down to get precise analysis; AI-enabled process

prediction; and system pre-configuration for users of QAD’s EAM.

Asset Information Center (AIC), an interactive parts system and CMMS add-on from Metanoia, simplifies how operators and maintenance personnel identify, manage, and consume asset information. “AIC provides a visual environment for identifying parts and a seamless integration with any ERP/CMMS to verify stock on hand throughout all relevant warehouses,” explains Metanoia Owner Kristopher Kneen.

With AIC, from any device, users can drill down through graphical bills of materials (BOM) or perform a Smart Search to easily identify any piece of equipment, part, or assembly. Additionally, through its Digitization Services, Metanoia builds interactive BOMs to efficiently identify, verify, and load parts to work orders. ▲



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DOC PALMER

Palmer's Planning Corner

WHY PROACTIVE WORK DIES IN THE BACKLOG

Is your maintenance staff sized for firefighting, or for profitability?

Most companies simply fix things as soon as they break, the faster the better. This strategy misses the mark because proper maintenance works to keep things from breaking in the first place!

Nonetheless, because we honestly have our hands full of reactive maintenance, proactive work requests simply die in the backlog before we can get to them. We have unconsciously sized our maintenance staffs to make that happen. Even so, planning and scheduling make it possible to do both the current reactive work and the proactive work to get ahead with the existing maintenance force.

Most of us basically misunderstand the fundamental concept of maintenance entirely. "Maintenance" is maintaining or keeping something in a state of working properly. But we think of maintenance as fixing stuff that has broken, restoring it to a condition of working properly. No, no, no! Something broke because we did not maintain it. If things are breaking, it is because we did not do our job of maintaining. We failed in our maintenance mission.

(More technically, our mission should be to maintain system function. For example, a plant system has a primary pump with a backup pump. The primary pump fails, but the backup pump kicks in with no disruption to the system. The key here is that we do not have to rush to react to the failed pump. The design of this example system allows maintaining safe, legal, and environmentally proper production of our product even though an individual pump fails.)

Let's define "reactive maintenance" simply as work where we have to rush. More specifically, reactive maintenance is work that cannot wait until next week to address a situation after its being identified. We have lost or are in imminent danger of losing an important system function.

Accordingly, let's define "proactive maintenance" simply as work where we do not have to rush. The need for action can wait until next week or longer. Examples of proactive maintenance include a prescribed routine PM to replace a filter and a vibration recommendation to replace a bearing on a seemingly smoothly running pump. Proactive maintenance can also be corrective work to stop a little drip that is not causing any alarm before it eventually rots out a deck or becomes a gusher that washes out a foundation.

Profits-wise, the industry "1:10 Rule" says that every \$1 spent on proactive maintenance saves \$10 on the bottom line! For every \$1 we spend properly greasing a bearing, we save \$10 by not having to replace the bearing, fix collateral damage, and lose product. Doing proactive maintenance serves up superior profits!

In addition, proactive maintenance is much safer! We do not have to rush out to work in the middle of the night or in terrible weather! And we have a better chance at assigning optimal personnel and getting a helpful planned package with a better head start for proper job steps, parts, and tools!

We could be a great company with superior profits, safety, and the rest, if it were not for the reactive situations. Nevertheless, the maintenance force simply cannot do any extra proactive work because its hands are full of reactive work. This exact staffing of not being able to do more proactive work is a result of misunderstanding the concept of keeping things from breaking.

Over the years, as we get ahead of breakdowns, we do not replace natural attrition of craftspersons. We reason, "we had ten electricians and two are leaving. Let's see if we can get by with eight." But when we get behind, we will hire more craftspersons. We reason, "things are breaking quite a bit. Let's



Doc Palmer, PE, MBA, CMRP is the author of McGraw-Hill's Maintenance Planning and Scheduling Handbook and is managing partner of Richard Palmer and Associates. For more information including currently scheduled workshops, visit www.palmerplanning.com or email Doc at docpalmer@palmerplanning.com.

hire a few more electricians.” Over the years, we have sized our staff to do enough PM to be a “good” company, but largely fixing things quickly as they break.

Usually, management does not even know there are proactive opportunities! First, people try to “help” the maintenance force. They tend not to report little problems (i.e., the proactive opportunities) because they know maintenance has its hands full of reactive work. Second, they also do not report little problems because it is frustrating to see such work requests “die” in the backlog. These issues are especially true for operators, but also for predictive maintenance analysts who often spend more time diagnosing obviously troubled assets than reporting little problems on smoothly running equipment.

To rise up beyond being a good plant to become a great plant with superior reliability and profits, we must do more proactive maintenance to eradicate the reactive work as much as possible altogether. The well-versed management question is, “how can we do more proactive maintenance when we honestly have our hands full of reactive maintenance?” Proper planning and scheduling give the answer.

Proper scheduling, supported by planned labor estimates, gives a pop of nearly 50% in work order completion. (That’s the purpose of scheduling: To help us complete more work than normal.) If we normally complete 1,000 work orders per month, we could be completing 1,500 work orders per month. All of the extra work orders, by definition, are proactive because we

had staffed ourselves over the years to keep up exactly with the reactive work. So, with the same staff, we can indeed complete more proactive work. We must.

Our backlog drops! The reduction encourages operators and others to tell us about little things. Our freedom from the tyranny of reactive work frees up craftspersons to generate proactive work through more investigative PM or training and assignment to running predictive maintenance technology routes. We become a proactive superior company.

We must understand that “maintenance” is keeping things from breaking, not about fixing things quickly after they break. Utilize proper planning and scheduling to do more proactive work than your competition.

Don’t settle for good. Be great! ▲

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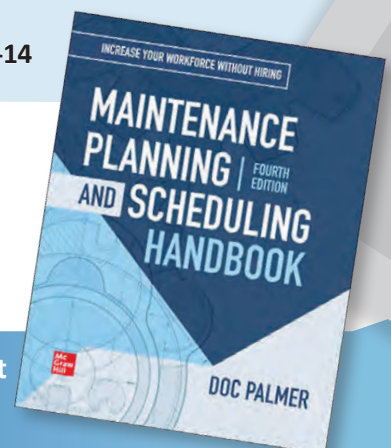
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JEFF SHIVER

From the Plant Floor

ADDRESSING THE SKILLS SHORTAGE

The solution starts with you and your company

In the most recent NAM Manufacturers Outlook Survey (Q3 2023), more than 72% of manufacturers cited the inability to attract and retain employees as their primary challenge. The U.S. Bureau of Labor Statistics projects that 3.1 million jobs in maintenance and repair occupations will be added between 2021 and 2031 due to retirements and new growth requirements for maintenance.

But if you have recently spent time in a manufacturing plant, this is not news, as you are likely acutely aware of the pain caused by the lack of qualified resources. The unfilled rate for industrial maintenance positions is high, ranging from 10% to 30% based on the role and location. In a four-team shift rotation, a 25% vacancy rate means that one team position must be covered by overtime or contract resources, or the shift does not have coverage during production. In many organizations, you can almost hear the sound of the vacuum as workers exit the door, as 20-plus years of knowledge leave.

FOR THE SHORT TERM

Stop relying primarily on tribal knowledge. Capture and share the knowledge wealth by documenting the work. Ensure your equipment hierarchy is accurate and that you have valid PM task plans for each asset as needed to ensure reliability. PM procedures often lack detail, sometimes existing only in name and description, with no tasks.

Also, there should be one right way to do the job, so build a library of corrective and outage job plans. Please don't tell me you will look up work order history over building the reusable job plan. Work order history does not provide standard work, and without standard work, there are variations in how each technician approaches the job. Don't forget that self-induced failures (including careless work behaviors) are the largest reason for equipment failures.

FOR THE LONGER TERM

Determine the skills and knowledge required to maintain your assets. The data is in your CMMS. Think about the work tasks, when the knowledge was needed, the frequency of the tasks, and how critical the tasks are.

Based on these factors, create a progression matrix of skills and knowledge steps to ascend in the technician ranks. Assess the existing technicians against the matrix to determine their opportunities. Provide education and coaching with the technicians once the gaps are identified. Use the same matrix to develop an apprenticeship program.

Partner with communities. Enrollment in advanced trades like electrical, controls, and instrumentation is not keeping pace with industry demand. This fact also highlights that we must change the perceptions of working in the manufacturing industry. We must battle against outdated views that the work is hard and dirty, the hours long with unpredictable shift schedules, and the lack of career advancement opportunities.

Consider speaking in middle and high school career days. Invite students to tour your facilities and show them a day in the life of a maintenance technician, along with the pay potential. That pay is often higher than a four-year academic college degree yields.

Please work with the local technical colleges to improve their curriculums and help drive recruitment. Some organizations create apprenticeships with local colleges that allows students to work with technicians as interns. Doing so gives the company the chance to build a relationship with students.

Lastly, change the recruitment practices to be more inclusive. If you have built out your workforce development program, you can take lesser-skilled personnel and educate them. ▲



Jeff Shiver, CMRP, is a founder and managing principal at People and Processes, Inc. Jeff guides people to achieve success in maintenance and reliability practices using common sense approaches. Visit www.PeopleandProcesses.com or email JShiver@PeopleandProcesses.com.



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TABLE STAKES

When it comes to
skills development,
is your team holding
a winning hand?

Written by

Thomas Wilk
Editor in Chief

Last January, ChatGPT and generative AI took the world by storm as the latest technologies of several poised to change manufacturing and heavy industry. To kick off the new year, Plant Services asked four expert practitioners and consultants to tackle questions on the ways that technology and market forces have shaped the M&R industry over the past 10 years.

This month's Ask The Experts panel:

Luke Clark, senior program manager for HECO Apollo

Shon Isenhour, CMRP, founder and owner at Eruditio

Chris Pepin, founder and managing partner at Progressive Reliability

Jeff Shiver, CMRP, founder and managing principal at People and Processes

1. How has the core skill set (and/or toolbox) of the average mechanical plant millwright changed over the past 10 years?

Jeff Shiver First, there's a lot of issues around the plants being at capacity. They're trying to produce everything that they can, and they can sell everything they produce. If we think about the millwright, specifically, they're doing a lot more with technology. There's a lot more automation, controls, and instrumentation than in the 10 years prior.

In reality the expectation for core skill sets among new millwright hires is being at the journeyman level. When new hires come in, there's an expectation that they can step in and do the role, or basically hop on shift and do the best they can. Technicians that have the skills are being asked to train the others but not allowed the time. In the past too, we would find that the unions would take a very active role in training. That's not the case anymore, although it varies by union.

Shon Isenhour I'm not sure the tools specifically have changed that much, but I do think the skill set has probably decreased. As far as the tools, the mechanical equipment hasn't changed significantly so the tools have not changed all that much. While we could argue the electrical and controls has for sure, but in general the tools have not changed significantly in the last 10 years.

Now let's talk about skills. There's been a huge loss of experience. A lot of people are understaffed or can't fill roles, so they are accepting people into their organizations that maybe are at a lower skill level than they would have in the past.

One of my concerns, is we've got this lower level of skill with the retirements and the lower standards of hiring, and then we're asking them to do more technical things. To me, that's a recipe for reduced reliability. If I don't teach them that there is a difference in two types of lubricants and they mix those two lubricants together, now I've got a potential reliability issue that was born out of a lower skill level and a lack of training.

Luke Clark I think the biggest change has been that in the past we would see a millwright or a technician be in a role and be in that same role for 10, 20, 30 years. What I think I've seen change in the workforce in that regard is upward mobility. Now they're more involved with decision making, more involved with the technologies, and the ones that really shine in those categories and move up, all of a sudden they have managerial expectations.

Chris Pepin I would say for the average millwright, the mechanical/technical piece hasn't changed very much in five years. Let's face it, we've still got plants with equipment going back to the 1930s. I think right now, the biggest challenge is doing more with less.

Also, the challenge is often more environmental than technical. We're working with a lot more bilingual sites, which isn't the core skill set you're probably thinking about, but it's certainly an environmental change that's going on. We've worked with plants that are Spanish-speaking only. You're going to have language barriers going on – northeast, southwest, south, you name it.

2. How has the core skill set (and/or toolbox) of the average reliability manager changed over the past 10 years?

Jeff Shiver For the reliability manager, the focus is shifting more and more to the following:

- strategic asset management
- data driven decision making
- regulatory compliance and sustainability
- financial acumen and risk management
- change management and the rate of change.

Some managers are really struggling with the rate of change in industry. Back 10 years ago, that rate of change was somewhat steady, but I would say now it's almost exponential. Also, as a manager, how do I become more financially aware and be able to talk the lingo to connect our work to higher-level financial goals?

Luke Clark In the past as a reliability manager, you were more focused on

your equipment, you're focused on the people that you are working with, and you would do some internal data analysis. Now there's external forces that you're going to have to deal with. You're going to have to deal with the new technologies and the new devices that are coming in, and you're going to have to make the right decisions. For reliability managers, it's being able to manage all these external forces and new implementations all at once.

You may not be a certified vibration analyst as a reliability manager, but you should have a good understanding of what vibration analysis is, and the benefits of it, and what you're going to use that data for. So if you bring on an IoT device, the benefits that you're going to get out of it are going to be exponentially higher if you have a reliability manager that understands those benefits in the first place and isn't buying a product just for the sake of a product.

Shon Isenhour It changes cyclically, as far as what's in favor and what people are excited about. You see things like Lean and Six Sigma, or PM optimization or FMEAs become very popular, and then they fade away, and then they become very popular again. On the bigger side, we've got a lot of new technology at our disposal that we didn't have 10 years ago, and the cost has come down on many of these technologies, so as a reliability person, the technologies may be a little more appealing than they were even a few years ago.

One thing I'm starting to notice is that a lot of people are doing potentially the right things for the wrong reasons, and using new technology to enable their reactive maintenance culture. They'll go out and they'll buy predictive maintenance technologies, not in order to enable their planning and scheduling process and reduce their maintenance

costs and improve their reliability, but more-so because they want to be able to identify problems and do emergency repairs on those problems. So they're not using the technology where it adds the most value.

Chris Pepin With reliability, the fundamentals are still the fundamentals, more now than ever. There's no new technology that's going to replace the importance of asset criticality and asset hierarchy. It doesn't matter how great the promise of your new Industry X.0 equipment is for productivity, the fundamentals remain. I think, in fact, as you add connectivity complexities and digital intervention in the environment, the ability to focus on the fundamentals of reliability has become even more important.

The other thing is, leaders today are working with three to four generations on-site at the same time. We've got Boomers, Gen X, Millennials, and Gen Z; so that creates a lot of viewpoints to manage. Diversity of thought and diversity of perspective is a major reality today, so the importance of communication and the importance of buy-in has expanded beyond previous years.

3. What Industry 4.0 technologies do you consider to be table stakes for current M&R professionals?

Luke Clark Between sensors, AI, and cameras, we're really getting to that point in time where we can actually look at a piece of equipment, we can analyze it in multiple different ways, and then we can also take that data and push it through AI or machine learning and make some actual educated decisions from it. That's the shift that we're seeing in our current IoT sphere.

Chris Pepin IoT is in the adoption curve where things are picking up

significantly. AI appears to be somewhat behind IoT, likely not for long. I believe AI is going to come up quick and make a refreshing impact on information access, knowledge capture and completely disrupt how we do training.

Shon Isenhour I think robots and automation, you pretty much have to do that now, especially because we can't hire enough people with the right skills. I think 5G has become more important, because now it's a way to get information and data out of the system, even if I can't get it through the traditional IT route. 5G also is becoming more and more critical to separate the internal network from the data that you don't necessarily need on the internal network. Especially with a lot of hacking and similar attacks recently, people aren't nearly as interested in putting more things on their internal networks.

Having more information and being able to run analytics on it is going to continue to be a game changer as we go forward. I'm not suggesting that everybody's doing it right, and I'm not suggesting everyone is using their data. I think as more and more organizations figure out how to interface with that data, whether it's AI or analytics, or whatever they choose to use, I think having the data is going to become more and more important.

Jeff Shiver Cybersecurity is table stakes too, because of all the connected technologies. How do we make sure that we're managing cybersecurity in a way, especially on the automation side? Some plants I know have been hacked, or had ransomware installed on their machines. They have been ransomed and had to pay or they would see their SAP system down for eight months or more. This is probably one of the more important table stakes as we continue to combine more and more things.

4. Which industry verticals, if any, tend to be quick to embrace newer technologies like IoT or AI? (this can include public utilities)

Shon Isenhour This was a fun question to think about, because when I think about who is progressive in certain areas, if we talk about AR and VR, as an example, which arguably is part of Industry 4.0, as well, that has been embraced more so by aerospace. Also, if you want to talk about robotics, automotive has always been very progressive in the use of robotics. You go into one of their plants, and very quickly you see a robot count that's much higher than what you would see in most facilities.

As I think about who truly embraced Industry 4.0 early it is power generation. That sector has had connected sensors embedded all over their units for more than 20 years, it's not new for them at all. I can think back to working in a power plant, helping them implement reliability in probably the late 2000s, and they were already fully instrumented and connected. You knew what was going on in every part of that facility.

Jeff Shiver Companies like automotive, aerospace have been quick to adopt some of these technologies. Energy, some of the public utilities are also relying more and more on some of this tech. There's a lot of emphasis with some ports these days to get into the digital transformation world, for example with the cranes that load the ships, but again, it depends on the port and it depends on the leadership. For one of the ports we work with, the CEO has overall responsibility for maintenance of the cranes. He's the one who's driving that, and because of that, he's spending the money and contractor resources and doing things like that, and some of his people are getting those assignments to go do it. But it's driven by that upper level.

Luke Clark If I were to say any industries that really jump on these kind of technologies quicker, they're either ones that are heavily audited, or they're ones that are entirely dependent on uptime.

Two examples of that: first, life sciences/pharmaceutical. They tend to be on the leading edge for technology, because they get audited, they have their data that needs to be in a specific way at a specific time. To survive those audits, they need to be able to show their process, so they are very much into standardization.

Another one that we've seen a lot of gain on when it comes to IoT devices is the power industry because they are measured entirely by uptime. So for them to be able to

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constantly monitor their equipment, that's crucial for them and they see the benefit instantly because their entire measurement is based on how often they're up and running.

Chris Pepin Sometimes diagnostic hardware can create disruption in fiefdoms because suddenly, this new thing is seeing the unseen, and people or teams can sometimes express defensiveness about it. There are varying degrees of cultural awareness that will be required, and making sure to curate a frame for empowering your workforce on a unified vision is the fundamental thing that we're always looking for.

5. In your opinion, what are one or two things that would make an impact in alleviating the hiring challenges currently associated with the M&R job market?

Chris Pepin Number one, despite all the data, despite all the challenges, despite all the stories, there are and will continue to be companies that are incredible at hiring. If hiring is a priority, you can win. If hiring is one of your top three priorities, you can win. It may be useful to consider a saying we use in setting our goals here: if you have more than three priorities, you have none.

The next thing is, you must use every option, often at scale. If you want to do the process you've been doing for eight years, you're going to find that you're only getting maybe 20% of what you used to get back then. However, if you're willing to adopt the full set of talent tools and tactics, then not will you get better, you become a magnetic organization in the process. If you rise with real value, even a little bit, you'll get outsized returns because of how powerful digital networks have become.

Finally, the biggest talent secret that I can share is that 70% of great hires come from internal referrals. When you have great people, they attract great referrals. When you have mediocre people, they attract mediocre referrals. Make sure you're working for and rewarding the referrals you want. Be relentless about it. We want to see great teams doing the right things so they can get the best people.

Shon Isenhour First is the planning of work with precision maintenance techniques included. If I know that we are going to do a job multiple times this year, then taking the time to plan that job effectively, taking the time to break it down into both a checklist and a step description for each of those elements is key. If I'm new here, I can learn from the job plan. If I'm an experienced individual, I can grab the little morsels from the checklist that I need in order to do it correctly.

My second point on this question is AI with human interaction. My experience is that AI produces a job plan that is somewhere between 30 and 60% accurate, and it's easier to edit a job plan than it is to create it from scratch. If AI helps me edit or create job plans, and I edit them, and instead of only 2-5% of the organizations planning, I can get 50% of the organizations out there beginning to plan, then that's going to allow them to be more efficient and more effective. They're going to have less reoccurring downtime and reoccurring failures, therefore needing less people to do the same work, which helps them with their hiring issues.

Also, if I train somebody and they leave, I lose everything. If I train somebody and I build a really good procedure or job plan at the same time to do that work, even if I lose them, I don't lose the procedure. It's there in the CMMS, it's in the job plan library, it can continue


to be used over and over providing value even after the people are gone.

Jeff Shiver One of the things we have to do too, and this is really key, is how do we change the perception of maintenance as a career path? And how do we manage the outreach into the high schools and similar places?

Inside the plant, apprenticeship and mentorship programs are one piece missing, along with continuous upskilling and learning opportunities within the facility. Another is collaboration with educational institutions. Some companies, for example, like ArcelorMittal with Nippon Steel and their partnership in Calvert, AL, they have state funded trainees and they have a training center on-site, and they do a tremendous job there. If we go to Nissan, in Smyrna, TN, they have a training center on-site that does a lot and is state funded, with a curriculum was set up specifically for that plant.

Luke Clark Oftentimes what keeps employees in this business is investing in your employees; that means training, that means safety, that includes certifications. You know, send them to a conference, get them involved and invest in those individuals.

What that's going to do is it's going to do two things for your company: it's going to get your people trained, and it's going to show that you find what they do important, and that you're willing to invest some money in them actually learning and bettering themselves.

I think that makes a big difference for this kind of job, because the reality is, it's a tough job. You're going to be asking people to have some hard hours, they're going to have to do things that none of us want to do, so show that you care, show some investment and make those people see this as a career versus just a job. 

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10 RELIABILITY AND MAINTENANCE TRUTHS

Written by

Joe Kuhn, CMRP

President, Lean Driven Reliability LLC

I worked in manufacturing plants for 32 years in assignments where I was accountable for results. My roles included maintenance engineer, maintenance manager, operations manager, plant manager, and director of global reliability and maintenance. As you make plans and take action in 2024, I challenge you to understand and evaluate my 10 Reliability and Maintenance Truths, which I have discovered on my journey.

I have a long story of failing and learning to go with each discovered truth. It is humbling to state that early in my career I believed the opposite of these truths. Let me help you understand these conclusions.

1. OPERATIONS OWNS RELIABILITY.

Who owns the reliability of your personal car? The mechanic at the shop or you the operator? Obviously, you do. The operator decides when to take the car into the shop and then approves and pays for all work performed. Operators are accountable to drive the car within design specifications, note sensory abnormalities (example: engine noise), and perform minor maintenance (example: filling tires with air). The mechanic is responsible for technical expertise, selling you on recommended actions, and efficient execution of work. Both are involved in reliability, but clearly the owner is the “decider,” and the mechanic is the “advisor.” At plants, the role of owner goes to operations, and the role of advisor goes to maintenance and engineering. Failure to accept this truth will greatly limit results.





2. EVERY RELIABILITY AND MAINTENANCE BEST PRACTICE ELIMINATES WASTE.

Why do you perform preventative maintenance on equipment? To extend the mean time between failure? To maintain run rate? To ensure quality product? Yes, yes, and yes. Each of these is a manufacturing waste. Why do we plan work? Answer: to improve worker safety, efficiency, and precision to name just three; again, all wastes. This is true for all best practices. This truth has the benefit of aligning the organization around an infectious mantra of waste elimination as opposed to draconian cost cutting mandates.



3. THE ONLY WAY TO KNOW THE WASTES IN YOUR PLANT IS THROUGH INTENSE OBSERVATION.

There is a massive gap between what you believe to be true in a conference room through KPIs and opinion and the reality on the shop floor. Opinion and KPIs should direct your observations, but do not fall into the overconfidence trap of discounting observation. By “intense,” I recommend at least eight hours of observation. For example: If you are looking at efficiency of planned work, I would suggest getting three teams of two persons to observe three different planned jobs for a full shift (one job per team). I would repeat this for three consecutive days. This process will not only detail existing wastes, but also reveal several free, rapid, and impactful actions that you can take in under 30 days. Rapid results are thus ensured.



4. KNOWING THE WASTES IN YOUR PLANT DICTATES YOUR ACTION PLAN.

Randomly implementing best practices without intimately knowing the wastes that exist in your plant is insane. You will not get results in a timely manner, which will discourage your sponsors and organization. Rapid, sustainable, and scalable results come from applying the right tool with precision to a prioritized problem impacting your plant. This delivers sustained sponsorship and organizational enthusiasm.



5. EVERY TECHNICIAN CAME TO WORK TODAY WANTING TO TAKE PRIDE IN PERFORMING THEIR WORK.

A common observation at plants is to see maintenance people standing or driving around the plant not performing work; a huge waste, right? Are they lazy? For years, I tried to implement systems on the work crews to improve these inefficiencies. When I performed intense observation alongside the crews, effectively walking a mile in their shoes, I realized the problem was me. The technicians were not the problem; it was the system in which I expected them to work that was restraining them. A thought experiment: what would you do differently at your plant if you truly believed everyone wanted to do a good job today?



6. CULTURE CHANGES ONE EXPERIENCE AT A TIME.

Few things strike more fear in leaders than expectations to change a culture. Years ago, in a training class I learned that culture stems from our experiences

that drive our beliefs that lead to our actions. These actions produce results. Consequently, culture is changed by simply creating new experiences. My challenge is to create these experiences on purpose each week. I have found this to be very empowering.



7. THE ONLY PATH TO REDUCING REACTIVE MAINTENANCE IS TO EXECUTE PLANNED MAINTENANCE.

The biggest lie maintenance managers tell themselves is, “We will begin to implement best practices as soon as we get caught up on unplanned maintenance.” Unfortunately, next week, next month and next quarter are going to be worse. Every leader must find a way to begin planned work today. If your plant is 100% reactive maintenance, start next week with 5% planned work and then increase this percentage over the coming weeks. Reactive maintenance will always be prioritized over unplanned work without leadership intervention (the squeaky wheel). Consider assigning two people (full crew size: 20) to planned work next week. Tell the crew supervisor that these two persons cannot be pulled into reactive maintenance without plant manager approval. Insight: the supervisor will find other ways to get the work completed without pulling the planned work technicians. This may include prioritizing work and overtime. Preservation of planned work must be a priority.



8. YOUR PLANT IS NEITHER DIFFERENT NOR SPECIAL.

I spent a lot of time with consultants and company leadership arguing that best practices may not all work in my plant because of our unique situation—our equipment is worn out; we have

a powerful union; we are understaffed; we are making a commodity product; now is not a good time since we have a corporate audit; we have no money, etc. Everyone has these issues. Once you accept that every reliability and maintenance best practice targets wastes, this excuse falls away for every process has wastes.

9. RELIABILITY ASSESSMENTS ARE OF LITTLE VALUE.

Often the start of a reliability journey is an assessment by an expert. The plant pays \$50,000 for a firm to come in and tell it a score on its 29 essential elements of a reliability culture. The plant receives a low score and a proposal for elevating the score over the next three years for a much larger fee. I have found several fatal flaws in this path:

- I have never experienced these assessments to be rooted in intense observation to understand plant wastes but rather opinion, KPIs experience, and an insignificant amount of observation.

- I should not delegate my responsibility to know where opportunity exists. I should know this myself through observation and knowing the best practices. Delegation is an indication of the lack of commitment needed for a culture change.
- Assessments do not detail the priority to implement best practices. Simple, free, and impactful actions to address wastes are not identified. This is critical to achieving quick wins leading to organizational enthusiasm and continued sponsorship.
- \$50,000 can be more effectively utilized by implementing 10 or more solutions from your observations. For example: lubrication point labeling, sight glasses, desiccant breathers and leak repairs.
- Most organizations are seeking a quick fix and take no action beyond the expensive assessment. The hope pre-assessment: what can we buy to take us from 100% reactive maintenance to 90% planned maintenance in six months without the leadership doing anything different? You are embarking upon a culture change, which cannot be purchased.

Experts do have a role in your journey, but it should not be discovery of a problem, but rather expert training on best practices on the waste(s) you select.

10. YOU ARE IN SALES AND MARKETING.

If you are in maintenance and reliability, you must make marketing and selling your actions and results a top priority. As an example: If you do problem solving and take lubrication failures on motor/pump systems reducing failures from 25 to 10 in a year, how are people to know? Take credit for the 15-failure reduction, connect it with the actions taken, and calculate a savings of time, materials, and production.

At my last plant, we targeted two success stories a week to go out via email to the organization. The email included a picture of the equipment, the people involved, the action taken, and the impact. Sales may seem like “tooting your own horn” but will become invaluable during downturns in the business when management is looking to make cuts. Marketing reliability will encourage cuts elsewhere. **Δ**



Joe Kuhn, CMRP, former plant manager, engineer, and global reliability consultant, is now president of Lean Driven Reliability LLC. His YouTube Channel offers content on creating a reliability culture as well as financial independence to help you retire early. Contact Joe Kuhn at joekuhn1964@gmail.com.

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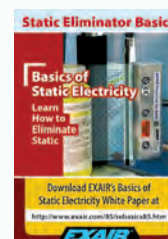
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Millwrights, take note of the new technology basics

PS *How has the core skill set (and/or toolbox) of the average mechanical millwright changed over the past 10 years?*

LC What we've seen for the average millwright, the average maintenance technician, is that it's shifted away from simply being expected to be able to be mechanical, to understand the equipment that you're working on, but also to be part of the greater system. We have data, we have our CMMS, we have IoT devices. That's all part of our ecosystem, and we have to make decisions based off of it, we have to know how to use that technology. We now have to know how to look at the data and understand and actually make decisions around it. The expectation from our millwrights is that you're able to utilize that technology in some way, shape, or form. At this point, a lot of journeyman integrate with technology, but for them, they tend to be the ones that have that mechanical experience, so they're the ones that stay in that role.

I think that the biggest challenge has been the entry level, because right off the bat we're teaching them technology, and so they learn the full business outside of just the mechanical aspects. Look at it this way, you get an entry level employee, you train them on the technologies, the processes, they're very involved with meetings, taking planning and scheduling meetings, and so on, and they're very involved with the business side of what you do. Then also you teach them the mechanical side, and then you look down the road 5-10 years later, and all sudden, they're a very valuable asset to your company, or they're very valuable to another company, and then they get poached or they get into managerial roles, so it's hard to keep someone in that millwright role for as long as we used to.

PS *What kinds of Industry 4.0 technologies do you consider to be table stakes for current maintenance and/or reliability professionals?*



Luke Clark is Senior Program Manager for HECO Apollo (www.hecoinc.com), and has more than 10 years of experience with enterprise asset management, IoT, asset health and reliability, and maintenance planning and scheduling. Listen to our full conversation: <https://plantservices.com/33018741>

LC With sensors, the technology has grown to the point, especially battery technology, where we're able to have remote sensors out there that we can have what we've always dreamed of where we can put a sensor out there and forget about it. We're getting much closer to that, and so companies more and more are starting to implement that kind of technology, even ones that are in very remote locations. Cellular technology is getting better, and so we're starting to be able to utilize these sensors in ways that we never were able to 5-10 years ago.

My second one would be AI. The pros and cons of sensors are how much data that is being brought in. We're starting to get to this point where we have data, we have lots of data, but we don't know what to do with it, and that's where AI is starting to come into play, where we're starting to analyze massive amounts of data.

One other one that I would mention is that cameras are really coming into play too. What I see with the sensors and AI is that the one thing we miss is true visibility. Anyone can look at a camera and visually see an issue. That's why I like motion amplification technology: if something's off balance, you don't even have to be mechanically minded to see, okay, that motor is bouncing back and forth, right? So you're really utilizing all the senses that are natural to us as humans to analyze, and it's becoming very, very intuitive.

Between sensors, AI, and cameras, we're really getting to that point in time where we can actually look at a piece of equipment, we can analyze it in multiple different ways, and then we can also take that data and push it through AI or machine learning and make some actual educated decisions from it. That's the shift that we're seeing in our current IoT sphere. **Δ**



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