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2024 Market Survey:

The Gap in Industrial Maintenance Team Training: **A Call for Modernization**

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INTRODUCTION

Highly skilled and well-trained maintenance teams are the lifeblood of any industrial manufacturing operation. They ensure the reliability, efficiency, and safety of production by proactively preventing equipment failures, minimizing downtime, and maximizing the lifespan of essential assets.

Investing in continuous training empowers maintenance teams with the latest knowledge, skills, and technologies to address increasingly complex equipment, optimize maintenance practices, and ultimately contribute significantly to the organization's profitability and competitiveness.

This report shows that training approaches haven't kept pace with advancements in the manufacturing industry itself. The "skills gap" and the exodus of experienced workers through retirement pose significant threats. Industrial manufacturers across various sectors risk losing access to the skilled teams they depend on.

Thankfully, a new generation of training solutions are designed to be faster, more accessible, and scalable, ensuring consistent, state-of-the-art training for all maintenance personnel, regardless of skill level.

This report analyzes data from nearly 200 manufacturers, exploring:

- The current makeup and approach to maintenance within their teams
- Training content, frequency, and delivery methods
- Time allocation for training and overall program satisfaction

The report will then highlight:

- The talent and skills gap impacting manufacturing
- Drawbacks of common training methods (on-the-job, peer-to-peer)
- The limitations of data access in measuring training effectiveness
- The inefficiencies and high costs associated with outdated training processes

Finally, we will explore how new training technologies can help you:

- Deliver more training to more people with greater consistency and less effort
- Upskill existing teams and attract new talent to replace retiring members or support growth

Ultimately, this report aims to empower you with insights into how other manufacturers are managing maintenance team training. We will also equip you with solutions to optimize your training investment and ensure your teams are prepared for success.

PART ONE:
UNDERSTANDING THE LANDSCAPE OF INDUSTRIAL MAINTENANCE:

The Backbone of Industrial Operations: The Vital Role of Maintenance Teams

Highly skilled and well-trained maintenance teams are the unsung heroes of industrial manufacturing. They play a critical role in ensuring the smooth and efficient operation of facilities, directly impacting factors like:

- **Production Reliability:** By proactively preventing equipment failures through scheduled maintenance, inspections, and repairs, maintenance teams minimize downtime and ensure production lines operate seamlessly.
- **Safety:** Maintenance activities play a crucial role in identifying and mitigating potential safety hazards associated with malfunctioning or aging equipment. A well-trained team can implement preventive measures and ensure a safe working environment.
- **Asset Lifespan:** Through proper maintenance practices, teams can extend the lifespan of crucial machinery and equipment, reducing replacement costs and maximizing the return on investment for these assets.
- **Operational Efficiency:** By optimizing maintenance practices and minimizing downtime, maintenance teams contribute significantly to overall operational efficiency, leading to increased productivity and cost savings.

Keeping Pace with Progress: The Challenge of Evolving Equipment Complexities

The industrial landscape is constantly evolving, with advancements in automation, robotics, and complex machinery becoming increasingly commonplace. This evolution presents a significant challenge for maintenance teams:

- **Advanced Technologies:** New equipment often incorporates sophisticated control systems, requiring a deeper understanding of diagnostics, troubleshooting, and repair procedures compared to traditional machinery.
- **Data Integration:** More advanced, smart, automated, and autonomous equipment frequently generates vast amounts of data, necessitating the ability to interpret and utilize this data for predictive maintenance and performance optimization.
- **Evolving Skillsets:** The skillsets required for maintaining this advanced equipment differ significantly from those needed for traditional machinery. Technicians need ongoing training to stay current with these advancements.

The Looming Talent Gap: A Growing Threat to Manufacturing

The manufacturing sector is facing a significant talent gap, with a wave of experienced workers reaching retirement age. A recent study by the Deloitte Research Center for Energy & Industrials forecasts that over the next 10 years, manufacturers could be short 1.9 million workers if the talent gap isn't fixed. This trend creates several challenges for maintenance teams:

- **Loss of Institutional Knowledge:** Experienced workers often possess valuable knowledge and skills accumulated over years on the job. Their retirement can lead to a loss of this "tribal knowledge," creating challenges for training the next generation of maintenance professionals.
- **Difficulty Filling Open Positions:** The skills required for modern maintenance positions may not be readily available in the current workforce pool, which can make recruiting and retaining qualified technicians challenging.
- **Increased Training Burden:** The need to bridge the skill gap places an additional burden on training programs to equip new hires and upskill existing staff with the knowledge and expertise required for maintaining complex equipment.

Survey Respondents: A Snapshot of the Industrial Landscape

To gain a deeper understanding of current trends and challenges, this report surveyed nearly 200 manufacturers across a diverse range of industries. The survey respondents included:

- **Company Sizes:** A mix of small (under 500 employees), medium (500-2500 employees), and large-scale manufacturers (more than 2,500 employees) were represented.
- **Industry Sectors:** The survey covered a wide variety of industries, providing insights into the specific needs and challenges across different manufacturing segments. The largest areas of operations were utilities/power generation (11%) and chemical and allied products (11%), followed by miscellaneous manufacturing industries (7%), pharmaceutical preparations (6%), and petroleum refining and related industries (6%).
- **Decision-Making Authority:** Two-thirds of respondents have authority over safety/fire control/security, training implementation, and/or training program design
- **State of Performance:** 62% said that their organization was performing in line with projections. 20% said they were sustainably performing beyond projections.

PART TWO:
THE CURRENT STATE OF MAINTENANCE TEAM TRAINING

Base: All respondents (n=189)

Maintenance Team Size and Growth Forecasts

While some respondents reported smaller teams (less than 20 full-time employees), a significant portion (39%) indicated teams exceeding 50 members. Looking ahead, 40% of respondents forecasted their teams would grow incrementally over the next two years, while another 46% indicated no anticipated change. Budgets mirrored these growth forecasts, with 51% expecting their training budget to grow incrementally as their workforce expands.

In the next two years, do you expect your maintenance team to:

Grow significantly
9%

Grow incrementally
40%

Not change
46%

Shrink incrementally
4%

Shrink significantly
1%

Retiring Team Members

Overall, half of respondents said they expect 11% to 25% of their maintenance and trades team to retire over the next decade. Notably, higher numbers of retirements were indicated among those identifying as maintenance supervisors and HR/Training managers, suggesting these roles may have deeper insight into the state of retirement within the maintenance workforce.

What percentage of your maintenance and trades team do you expect to retire in the next 10 years?

Less than 10%
32%

11-25%
45%

26-50%
21%

51-75%
2%

More than 75%
0%

Maintenance Team Experience

Sixty percent of respondents reported their maintenance team was primarily composed of intermediate (technicians with some experience and proficiency in basic maintenance tasks) and advanced technicians (highly skilled and experienced technicians capable of handling complex repairs and troubleshooting).

What is the experience makeup of your maintenance team?

Entry-level: New hires with limited experience, undergoing initial training and gaining basic skills

15%*

Intermediate: Technicians with some experience and proficiency in basic maintenance tasks

30%*

Advanced: Highly skilled and experienced technicians capable of handling complex repairs and troubleshooting

30%*

Specialist: Technicians with specialized expertise in specific equipment or systems

20%*

**median percentage*

Most Sought-After Skills

Two-thirds of respondents prioritized the ability to diagnose and troubleshoot issues as the most desired skill for their maintenance teams. Other top desired skills included proficiency in core maintenance tasks and the ability to work effectively in a team setting.

What are the skills and abilities you seek most from your maintenance team?

Ability to diagnose and troubleshoot issues

65%

Proficiency in core maintenance tasks

58%

Ability to work effectively in a team

40%

Finding creative solutions to complex problems

26%

Clear and concise communication

21%

Making informed decisions under pressure

21%

Familiarity with industry standards and regulations

20%

Open to feedback and continuous learning

17%

Analyzing data and identifying patterns

16%

Other (please specify)

1%

Approaches to Maintenance

The survey revealed a diverse range of approaches to maintenance within industrial facilities. Each approach requires appropriate training for its successful implementation. While preventive maintenance emerged as the most popular strategy, other approaches are also utilized. Here's a breakdown of the most common approaches, listed in order of popularity:

- **Preventive Maintenance (30%):** This proactive approach focuses on scheduled maintenance tasks such as lubrication, cleaning, and inspections to prevent equipment breakdowns and minimize downtime.
- **Predictive Maintenance (15%):** This approach leverages technologies like vibration analysis, oil analysis, and thermal imaging to anticipate potential equipment issues before they occur, allowing for timely intervention and avoiding costly breakdowns.
- **Run-to-Failure (10%):** This reactive approach involves waiting for equipment to break down before repairing it. While often less desirable due to potential downtime and safety risks, it may be suitable for certain low-criticality equipment.
- **Reliability-Centered Maintenance (RCM) (10%):** This approach focuses on identifying critical equipment components and implementing maintenance strategies to maximize their reliability and minimize downtime.
- **Condition-Based Maintenance (CBM) (10%):** This approach relies on real-time monitoring of equipment condition through sensors and data analysis to schedule maintenance as needed, optimizing resource allocation and preventing unnecessary downtime.

Please estimate the current mix of maintenance approaches at your facility.

Run-to-failure: This approach involves waiting for equipment to break down before repairing it

10%*

Preventive maintenance: This involves scheduled maintenance tasks like lubrication, cleaning, and inspections to prevent breakdowns

30%*

Predictive maintenance: This utilizes technologies like vibration analysis, oil analysis, and thermal imaging to predict equipment problems before they occur

15%*

Reliability-centered maintenance (RCM): This approach focuses on identifying critical equipment components and implementing maintenance strategies to maximize their reliability

10%*

Condition-based maintenance (CBM): This approach relies on real-time monitoring of equipment condition through sensors and data analysis to schedule maintenance as needed.

10%*

**median percentage*

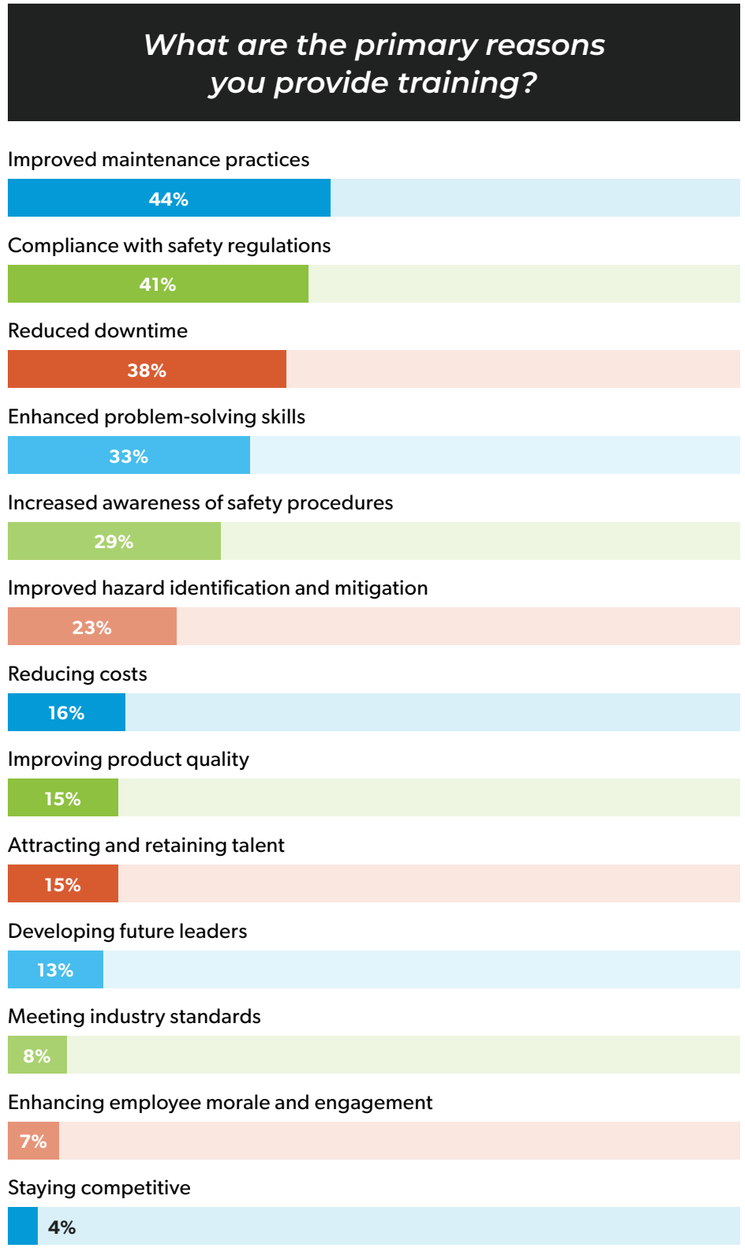
Training Efforts, Approaches, Challenges, and Successes

Despite significant effort, time, and resources being allocated to training maintenance teams, the overall effectiveness of these efforts is perceived as mediocre by half of the respondents.

Reasons for Training

The survey identified several key reasons for providing training, with the top three being:

- Improved maintenance practices (44%)
- Compliance with safety regulations (41%)
- Reduced downtime (38%)



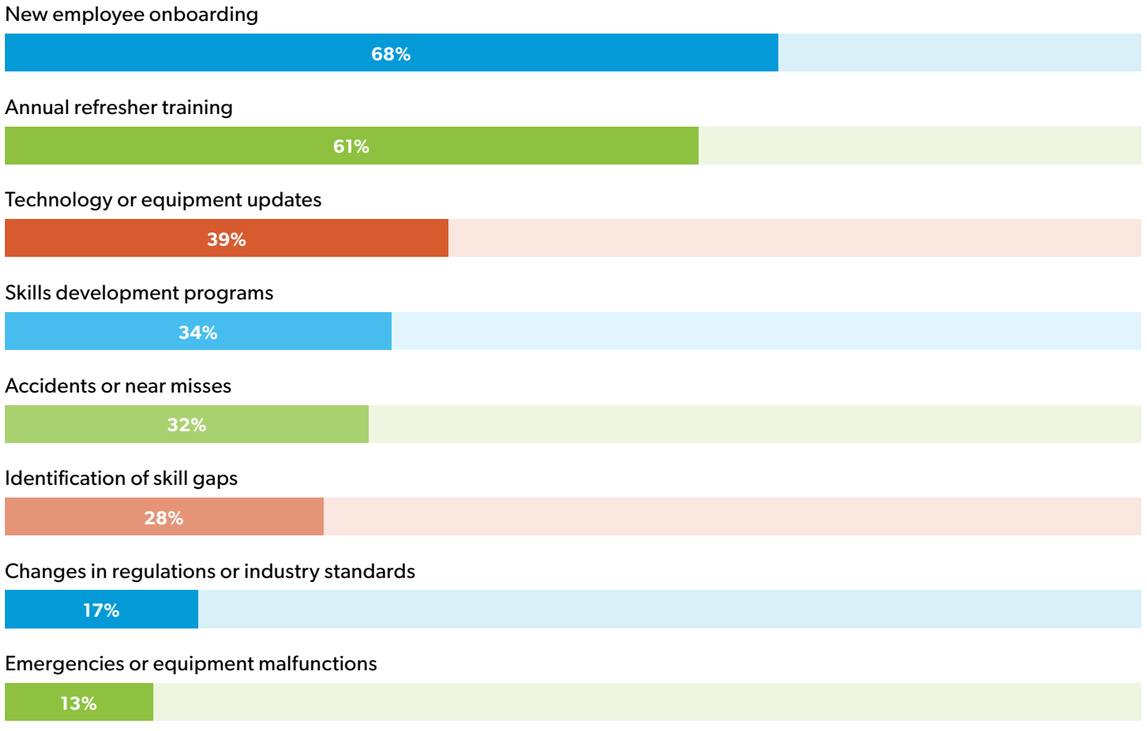
Triggers for Training

The most common triggers for initiating training include:

- New employee onboarding (68%)
- Annual refresher training (61%)
- Technology or equipment upgrades (39%)

However, it's noteworthy that nearly half of respondents also reported initiating training due to accidents, near misses, emergencies, and malfunctions. This suggests that a more proactive approach to training, including regular skills development programs, might be beneficial.

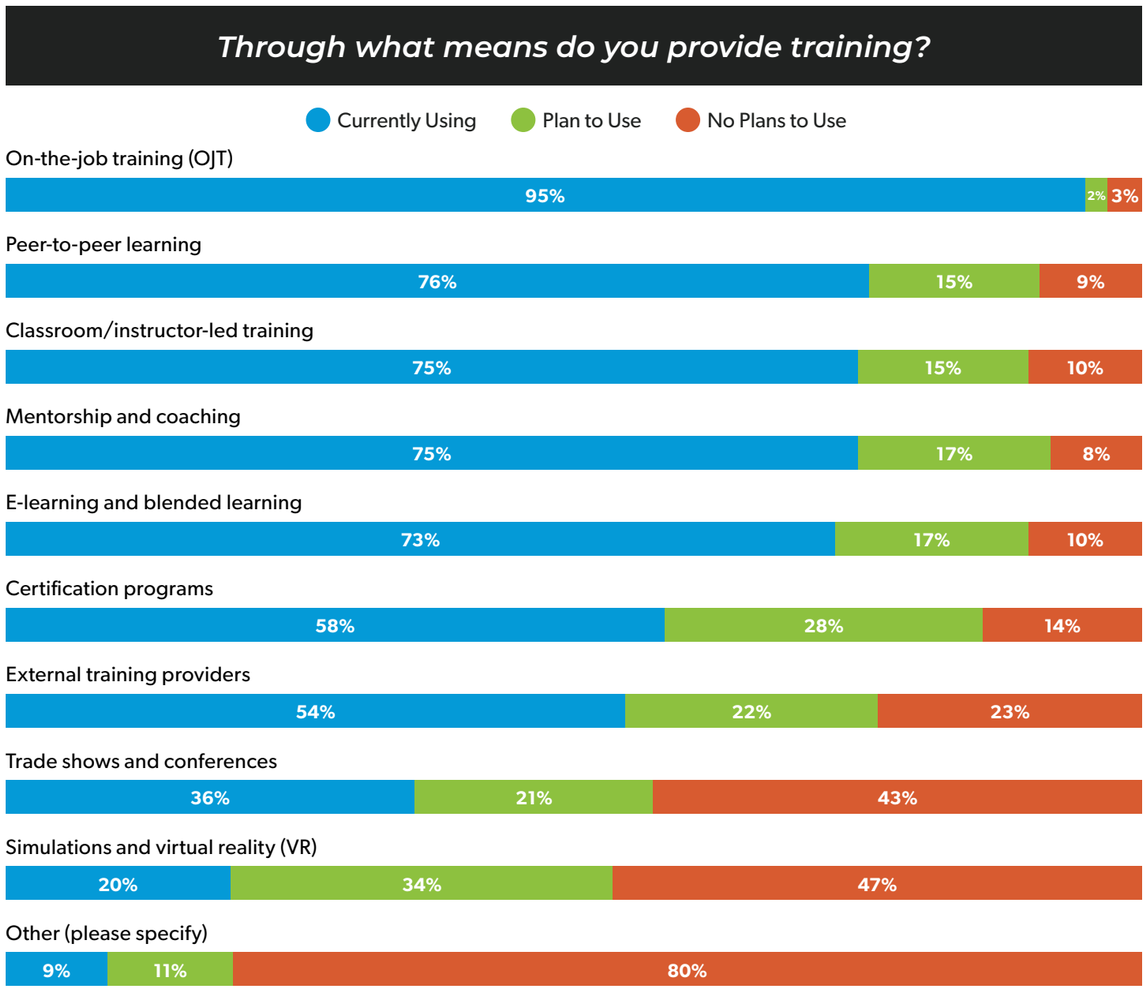
What are the top three events, objectives or situations that trigger you to provide training for your facilities maintenance staff?



Means for Providing Training

The most popular method for delivering training is on-the-job training (OJT), with 95% of respondents indicating it as their preferred approach. Other common methods include:

- Peer-to-peer learning
- Classroom/instructor-led training
- Mentorship and coaching
- E-learning and blended learning

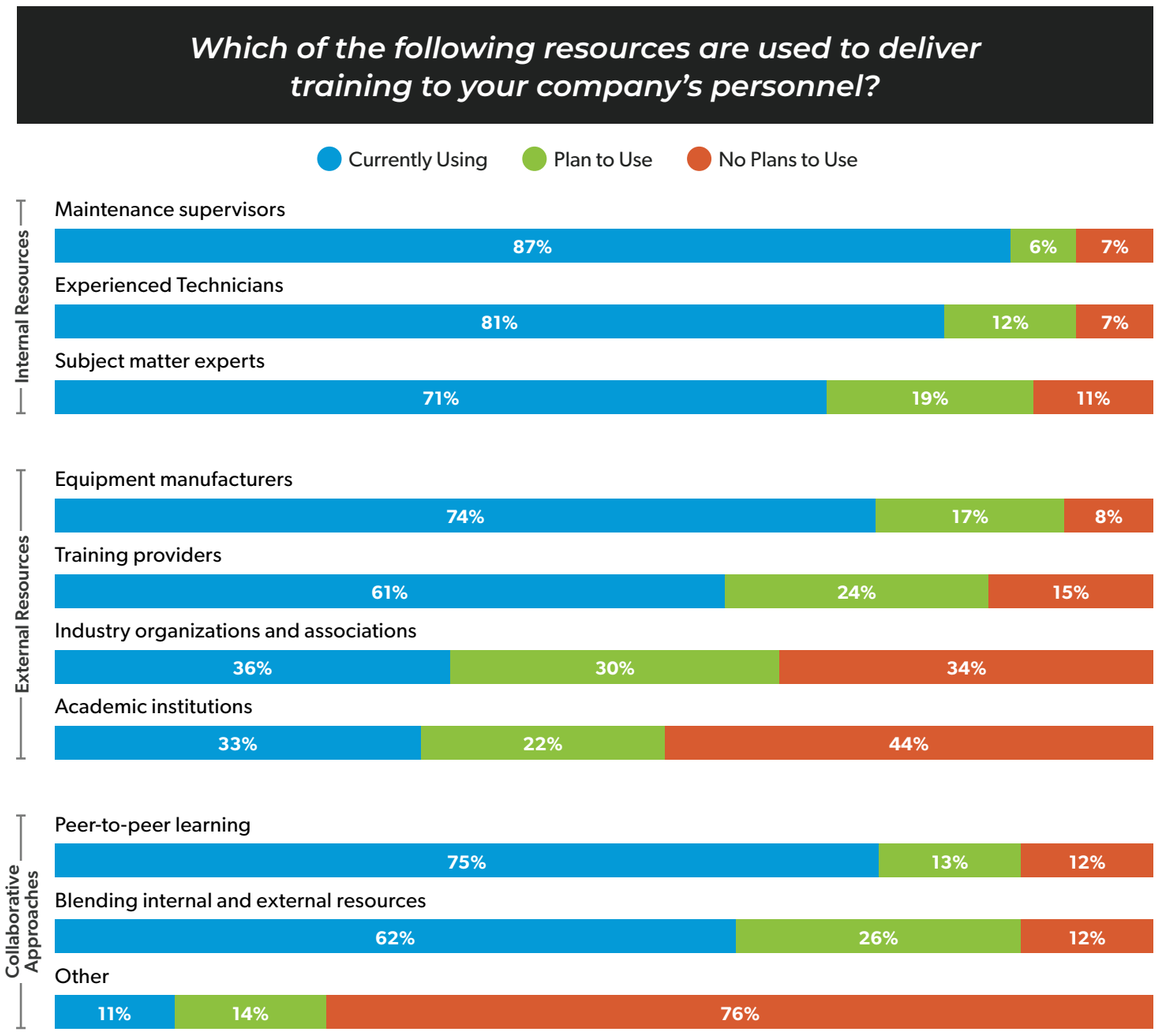


Resources Used for Training

The primary resources for delivering training are internal, leveraging:

- Maintenance supervisors
- Experienced technicians
- Subject matter experts

External resources, such as equipment manufacturers, are also utilized.



Time Spent on Training Administration and Attendance

A significant amount of time is dedicated to training, as evidenced by:

- 37% of respondents spending 1-3 hours per week administering training programs
- 28% of maintenance teams spending 1-3 hours per week attending training sessions

However, a closer look by role reveals a potential inefficiency:

- 13% of maintenance technicians (skilled tradespeople), crucial personnel for hands-on operations, dedicate a significant 5-8 hours per week to administering training programs.

This is in contrast to maintenance supervisors/managers, who are expected to oversee training. While 33% of them spend 5-8 hours on administrative tasks, an additional 18% dedicate over 8 hours.

This distribution highlights the importance of maximizing the effectiveness of training hours. Streamlining training administration, particularly for highly skilled technicians, could free up valuable time for them to focus on core tasks and knowledge sharing within the team.

TIME TO ADMINISTER TRAINING PROGRAMS

Maintenance Supervisors

33% are spending 5-8 hours a week;
20% are spending 8+ hours

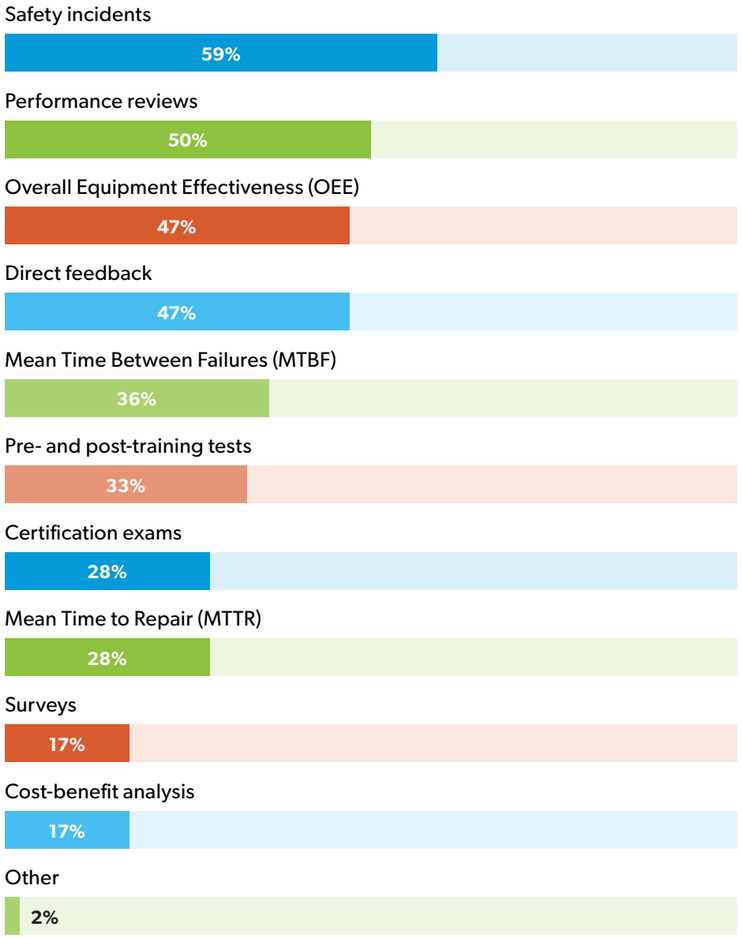
Maintenance Technician Skilled Trades

13% are spending 5-8 hours a week

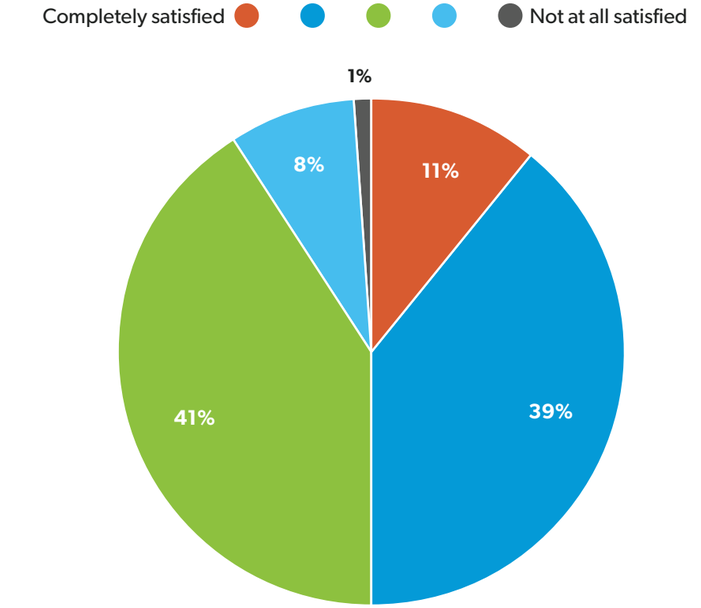
Satisfaction vs. Effort:

Only half of respondents expressed satisfaction with their current training efforts, indicating room for improvement. Additionally, the primary measure of success being the number of safety incidents suggests a reactive approach to training evaluation.

How do you measure the success of your training efforts?



How satisfied are you with the effectiveness of your training efforts?



Room for improvement:

As the needs for skilled maintenance teams continue to grow, the current training landscape presents several opportunities for improvement:

- **Shifting from Reactive to Proactive:** The survey highlights a reliance on reactive training triggered by incidents or new hires. A more proactive approach, including regular skills development programs and knowledge-sharing initiatives, could significantly enhance team preparedness.
- **Diversifying Training Methods:** While on-the-job training remains valuable, exploring a wider range of methods like e-learning, blended learning, and external expertise can cater to diverse learning styles and address evolving skill sets.
- **Optimizing Time and Resources:** The significant time and resources invested in training necessitate maximizing their effectiveness. Implementing efficient training delivery methods and measuring outcomes through metrics beyond safety incidents can ensure a better return on investment.

These improvements, coupled with the growing focus on preventive and predictive maintenance, hold the potential to significantly enhance the capabilities and effectiveness of maintenance teams.

PART THREE:
OPPORTUNITIES ABOUND IN MAINTENANCE TRAINING

While traditional training methods like on-the-job training and peer-to-peer learning have served their purpose, they face limitations in today's rapidly evolving industrial landscape.

Limitations of Traditional Training

- **Limited Scope:** On-the-job training often focuses on immediate tasks, neglecting broader skill development and knowledge transfer.
- **Inconsistent Knowledge Sharing:** Peer-to-peer learning can be valuable, but the effectiveness depends heavily on individual expertise and may not be standardized.
- **Data Dependence:** Measuring the impact of training programs can be challenging due to a lack of robust data collection and analysis.
- **Time and Cost:** Traditional training methods can be time-consuming and expensive, often requiring employees and the internal teams needed to train them to be taken off the job.

A New Era of Training Solutions

The need for a more efficient and effective approach to maintenance team training has paved the way for a new generation of training technologies and solutions.

Benefits of Advanced Training Solutions

- **Scalability:** Modern training platforms can easily accommodate large and geographically dispersed teams, ensuring consistent training delivery.
- **Accessibility:** E-learning, simulation modules, and mobile-friendly content make training readily available anytime, anywhere.
- **Consistency:** Standardized training content ensures all team members receive the same level of knowledge and skills.
- **Data-Driven Insights:** Advanced platforms provide detailed data on training completion, knowledge retention, and performance, enabling targeted interventions and continuous improvement.

Addressing the Challenges:

These advancements directly address the identified challenges:

- **Talent Gap:** Scalable training platforms can address the talent gap by upskilling existing employees and onboarding new hires efficiently.
- **Data Access:** Data-driven training solutions provide valuable insights into training effectiveness, allowing for targeted improvements and skill development.
- **Cost and Inefficiency:** E-learning and blended learning formats reduce time spent away from work and result in less time administering programs and a lesser toll on skill maintenance teams who would typically deliver the training — leading to significant cost savings.

NOTES FROM THE FIELD

We asked respondents to share their wisdom as it relates to successful approaches to training maintenance teams. Here is a sample of responses:

- 5 min safety talk every morning
- Always staying one step ahead
- Define clear goals of the training, make sure operators understanding that the training will help to keep them safe
- E-training with a quiz at the end can be an effective way to train associates of all ages.
- Training materials and resources should be specific to each topic, a great outline and instructional content
- Post training Evaluation and Delivery of training to more staff (as a measure of training effectiveness)
- Tying the development of employees into improved quality and reliability serves to build pride, belief and performance in safely meeting the needs of our customers.
- Use maintenance team feedback to determine the best way to distribute training
- Using Zoom to share best practices with all teams across the company

TPC Training: Empowering Manufacturers:

TPC Training offers a comprehensive suite of advanced training solutions specifically designed for manufacturers. Our platforms provide:

- A vast library of on-demand courses covering critical maintenance skills and procedures
- Interactive learning modules that engage learners and enhance knowledge retention
- Data-driven insights and reporting to track progress and measure training effectiveness
- Flexible delivery options to accommodate diverse learning styles and schedules
- Instructor-led training courses led by expert, field-experienced instructors — virtually, in-person, or at your site.

By leveraging modern industrial training solutions, manufacturers can overcome the limitations of traditional training methods and empower their maintenance teams with the skills and knowledge needed to thrive in today's resource-constrained and ever-changing environment.

CONCLUSION

The manufacturing industry faces a critical need for skilled and adaptable maintenance teams. While current training practices have served their purpose, the evolving landscape demands a more proactive and efficient approach. By embracing advanced training technologies and solutions, manufacturers can equip their teams with the knowledge and skills necessary to optimize equipment performance, minimize downtime, and ensure safety. This shift towards data-driven, scalable, and accessible training holds the potential to empower maintenance teams and drive significant improvements in operational efficiency and productivity.

ABOUT TPC

TPC has provided industrial training solutions to our clients for decades and in that time, we have built a reputation as a leader in the technical training industry. Our instructor-led and online training solutions span electrical, HVAC, mechanical, plant management, and safety topics, and we offer complementary technologies and compliance solutions for a variety of industries. In 2021, TPC was acquired by American Safety Council, bolstering the strength of our safety training programs. In 2023, American Safety Council became Certus. In combination with the other Certus brands, our company provides training and compliance solutions to over 3.4 million clients every year. Together, we are unleashing learners' full potential to help them reach their goals.

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