SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

ANNUAL SALES MEETING

DECEMBER
5-7th
2018

seamgroup.com

Beechmont Country Club
29600 Chagrin Blvd
Cleveland, OH 44122
216.831.9100

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

2018/19 FIRST ANNUAL SALES MEETING

AGENDA | DECEMBER 5th - 7th 2018

BEECHMONT COUNTRY CLUB • 29600 CHAGRIN BLVD., CLEVELAND, OH 44122 • 216.831.9100

WEDNESDAY • DECEMBER 5th

MEETING		TIME
New Company Name & Directions Mike Vea	45 min	12:30 – 1:15
Introductions & Opening Comments Mike Vea	45 min	1:15 – 2:00
Infrared Bret Bevis	60 min	2:00 – 3:00
Arc Flash Jay Smith	60 min	3:00 – 4:00
Maintenance Michael Friedman & Matt King	60 min	4:00 – 5:00
Combustible Dust Jason Reason	40 min	5:00 – 5:40
Wrap-Up Ralph DeLisio	10 min	5:40 – 5:50
Team Meetings	60 min	6:00 – 7:00

THURSDAY • DECEMBER 6th

MEETING		TIME
Coffee & Fruit	45 min	7:15 – 8:00
Reliability Joe Pitman	60 min	8:00 – 9:00
SalesForce Review Laurie Meissner	60 min	9:00 – 10:00
VUMO Mark Mollison	40 min	10:00 – 10:40
Break	10 min	10:40 – 10:50
Lockout / Tagout Jason Anthony	40 min	10:50 – 11:30
Sales Introduction Ralph DeLisio	40 min	11:30 – 12:10
Lunch	60 min	12:30 – 1:30
Sales Initiatives, Key Account Strategy & Planning Don Frankel & Ralph DeLisio	240 min	1:30 – 5:30
Training Jay Smith	30min	5:00 – 5:30

Sales Team Dinner - Geraci's Restaurant

FRIDAY • DECEMBER 7th

MEETING		TIME
Coffee & Fruit	45 min	7:45 – 8:30
Operational Excellence Colin Duncan	60 min	8:30 – 9:30
IT Review John Harman	45 min	9:30 – 10:15
Break	15 min	10:15 – 10:30
HR Review Megan Trainer	45 min	10:30 – 11:15
Operational Updates John Pucillo	45 min	11:15 – 12:00
Wrap-Up Ralph DeLisio	30 min	12:00 – 12:30
Lunch	45 min	12:30 – 1:15
Executive Session Mike Vea & Don Frankel	90 min	1:30 – 3:00
Holiday Party		6:30 – 11:00

INFRARED
INSPECTIONS

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

USING INFRARED INSPECTIONS TO DETECT ISSUES BEFORE FAILURES OCCUR

BENEFITS OF INFRARED INSPECTIONS:

- Detect problems quickly, without interrupting service
- Document energy savings
- Increase safety
- Significantly reduce unscheduled power outages
- Minimize preventative maintenance and troubleshooting time
- OEM warranty protection
- Reduce insurance premiums

Electrical and mechanical failures occur over time. Unexpected failures can be costly, however it is possible to avoid failure if periodical asset condition testing is undertaken. Infrared assessment can be employed to monitor the thermal capacity of electrical and mechanical equipment without the need of shut down. Infrared is a proven technology in the ability to predict impending failures and reduce risk. Consequently, increased production efficiency and operation safety is provided.

Studies have shown that integrating infrared into a proactive maintenance approach can reduce energy consumption by up to 15%. Annual testing is a cost-effective means of non-destructive testing to keep their electrical and mechanical equipment operating safely and efficiently.

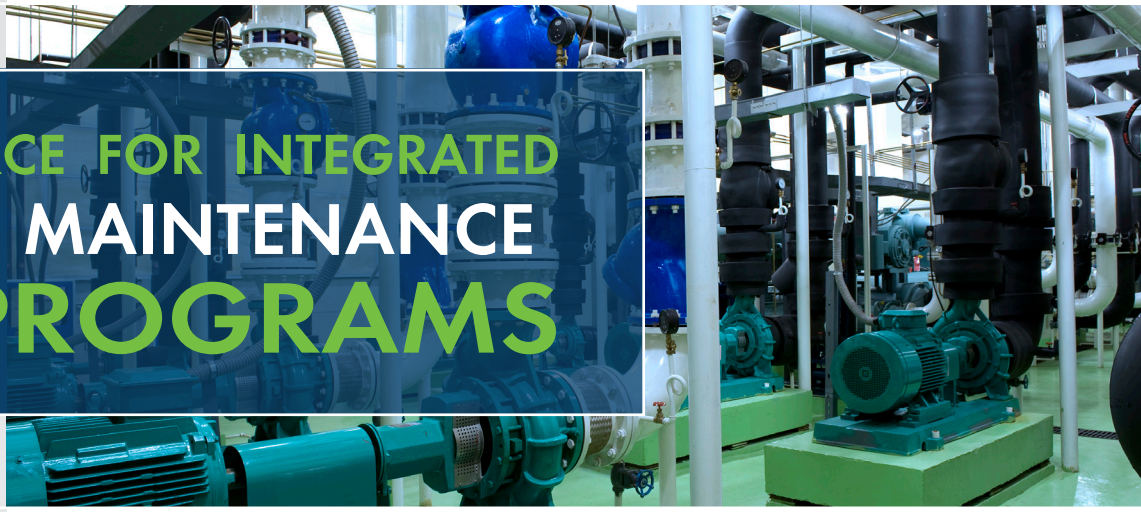
Seam Group believes a complete standardized process is the best approach to ensure your infrared inspections are done the right way, every time. This includes:

- Creating a detailed inventory of all your assets
- Capturing both a digital and thermographic image of each asset
- Collecting OEM data (model number, ratings, etc) where available and accessible
- Apply QR codes with unique identification numbers to each asset
- Visually inspecting for NEC and OSHA Code Violations
- Posting all assets on our real time web application, ViewPoint®, to view and edit results, download a comprehensive report, as well as track energy savings and repairs
- View history, update and repair problems in the field with ViewPoint on Demand

Seam Group
Global Headquarters
25200 Chagrin Blvd.
Cleveland, Ohio 44122

To learn more about our Infrared Inspection Program or ViewPoint, contact us at info@seamgroup.com • 866.772.6770

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



SINGLE SOURCE FOR INTEGRATED PREDICTIVE MAINTENANCE (PdM) PROGRAMS

OUR COLLABORATIVE PROCESS CONSISTS OF:

- **Perform and Review Equipment Criticality Assessments**
- **Determine which PdM technologies can be used to effectively predict equipment condition**
- **Determine program design and scope**
- **Program implementation with baselines, goals and KPI's**
- **Routine monitoring and continuous improvement processes**

We believe that one size does not fit all when pertaining to developing a 'Conditioned-based Maintenance strategy.' Successful PdM programs are customized to fit our client's needs, equipment, priorities, resources, budget and culture. We develop a client-tailored strategy to ensure the overall effectiveness of the PdM program.

SEAM Group can design a program strategy that best suits your business needs whether you are developing an in-house program and need assistance or you prefer to outsource the PdM functions to an expert to compliment your current reliability efforts.

Our customized program services include:

- Program design and implementation collaboration
- Program base lining
- Onsite and remote services including:
  - Infrared Inspections
  - Vibration Monitoring
  - Ultrasound Testing
  - Motor Testing
  - Oil Analysis
- Training and mentoring services
- Worldwide PdM consulting and program delivery to manage a single plant or entire enterprise
- Viewpoint® is where approach, management and results of all PdM technologies come together. A web-based, single source management tool to manage and monitor all inspections. Tailored reports and cost benefit calculations to demonstrate ROI and energy savings to build business cases

To talk further about your individual reliabilty program needs, contact us at info@seamgroup.com

Seam Group
Global Headquarters
25200 Chagrin Blvd.
Cleveland, Ohio 44122

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

CHILLER INSPECTION SERVICE

AS A LEADING SUPPLIER OF PREDICTIVE MAINTENANCE SERVICES, PREDICTIVE SERVICE PROVIDES THE PEACE OF MIND BY ENSURING FACILITIES ARE OPERATING SAFELY AND RELIABLY.

When assessing critical systems and equipment in a facility, the chilled water system tends to be near or at the top of that list. The chiller compressor is typically the main component and highest cost asset of the system. To ensure the chiller system is operating at peak performance, SEAM Group offers a comprehensive testing package which includes:

- **Vibration data collection and analysis on the chiller compressor and related pumps**
- **Infrared inspection on the motor starter, motor connections, the motor control center and frequency drive**
- **Motor signature analysis**
- **Power quality analysis**

Our chiller inspection service identifies impending problems which limits damage, unplanned downtime or catastrophic failure. Other benefits of this service include; reduced energy consumption, minimized repair costs and extended asset life.

866.772.6770 • 216.378.3500 • info@seamgroup.com • seamgroup.com

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

SEAM GROUP'S INFRARED WINDOWS

Allowing Safe Monitoring of Inaccessible Equipment

IS YOUR INFRARED PREDICTIVE MAINTENANCE PROGRAM OFFERING COMPLETE COVERAGE OF ALL ASSETS?

As the industry leader in electrical infrared, we provide comprehensive inspection programs of the highest quality. With emphasis on electrical safety, many assets, including those that were previously inspected, can no longer be opened while energized due to the equipment's newly calculated voltage or incident energy rating.

INFRARED (IR) WINDOW

- Square IR window optic provides best in class field of view, up to 65% more optic area than similar sized round windows
- Impact-resistant optic for unsurpassed durability
- Full field of view by placing camera lens on the window optic
- Polymer optic is resistant to moisture, humidity, broad spectrum of acids and alkalis for longevity and stable transmission
- Transmission throughout the entire long wave and mid wave IR spectra for accurate temperature andmeasurements
- Fail safe honeycomb stainless steel finger guard for optic area

BENEFITS

- Eliminates inherently high risk tasks, such as removing panels or opening hinged doors, making infrared inspections safer for personnel, plant assets and processes.
- Closed-panel inspections methods comply with regulatory standards such as OSHA, NFPA 70E, CSA Z462 and similar electrical safety mandates
- Workers perform infrared inspections while keeping energized equipment closed, and in "normal operating condition."
- Infrared inspections can be completed at peak loading times on all assets not accessible due to safety or company regulations
- Expert installation by licensed electrician ensuring proper window placement and field of view

TAKE THE FIRST STEP. CONTACT US TODAY.

SEAM Group Global Headquarters • 866.772.6770 • seamgroup.com

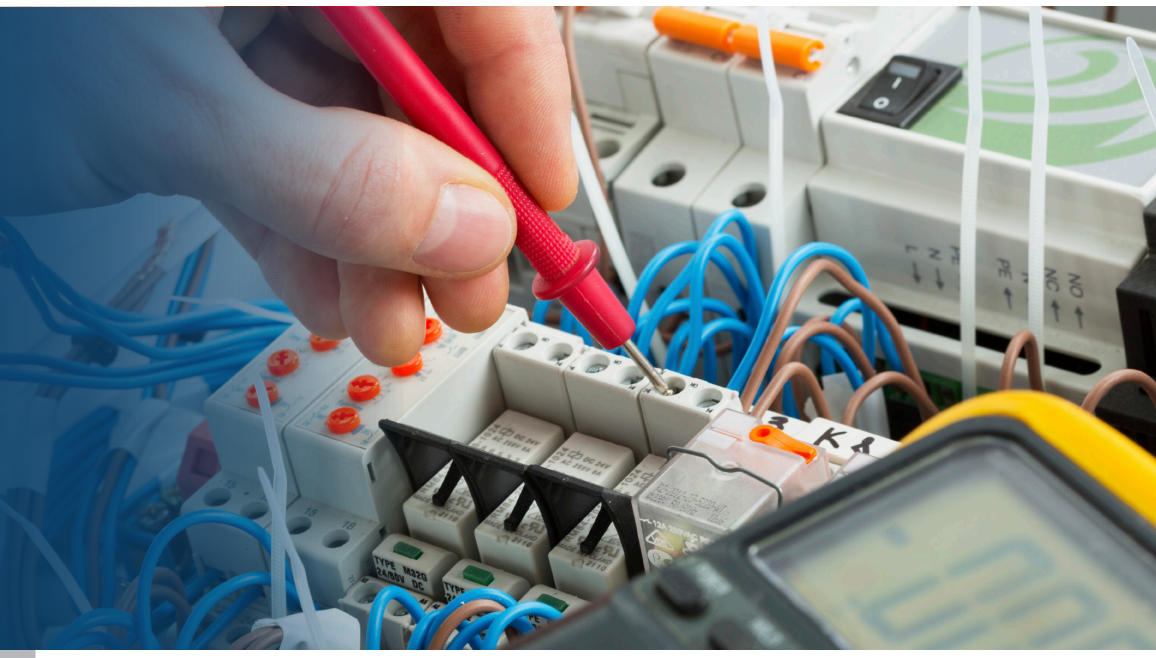
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

PREDICTIVE SERVICE MAINTENANCE

seamgroup.com

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

ADDING A "HYBRID" APPROACH TO FACILITY MANAGEMENT



WITH PREDICTIVE MAINTENANCE SOLUTIONS YOU WILL RECEIVE THE FOLLOWING:

- **Competitive Pricing**
- **Brand protection**
- **Boutique, collaborative approach to unique client needs**
- **Strong, value-added partnerships with key suppliers**

Predictive Service is uniquely suited to improve trade performance for all of your facility's needs. How? Some key benefits of our hybrid approach include:

- Licensed field and office staff, allowing us to both self-perform and professionally manage local resource partners
- A highly scalable, fully credentialed network of local resource partners to ensure jobs are done correctly and efficiently
- 24/7 services to clients 365 days a year in the U.S., Canada, Puerto Rico, the U.S. Virgin Islands, & Mexico
- We serve clients in a multitude of industries, including retail, hospitality, restaurant, commercial and industrial spaces

Our Services Include:

- Electrical
- Lighting
- Signage
- General Repairs/Handyman
- Preventive Maintenance Programs
- Capital Improvements
- National Rollouts
- Store Closings/Dark Stores
- General Contracting
- 24-hour emergency and on-demand service with prompt response

Seam Group
1600 Boston-Providence Highway
Walpole, MA 02081

Let Seam Group provide your facilities Management Solutions today by contacting us at 1.866.334.3379 or service@seamgroup.com

MAINTENANCE
SOLUTIONS
FACT SHEET

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

MAINTENANCE SOLUTIONS
COST-EFFECTIVE ELECTRICAL SERVICES
WITH PROFESSIONAL OVERSIGHT

SEAM Group Maintenance Solutions is a leading project and on-demand electrical and lighting service provider to clients across North America. With more than 10 years of experience combining technical capabilities and advisory services, Maintenance Solutions is a perfect example of how SEAM Group's diverse knowledge and expertise yields added value for its clients.

What is SEAM Group Maintenance Solutions?

- We are a total solutions provider of turnkey electrical repair, lighting repair, and project roll-out services.
- We oversee a network of more than 5,000 pre-qualified electricians operating under oversight by licensed professionals to deliver high-quality service at a very competitive price point.
- We both self-perform for clients as well as provide management of our local technician network to ensure jobs are done correctly and efficiently.
- We provide services to clients 365 days a year and 24 hours per day, regardless of weather or emergency conditions, to the U.S., Canada, Puerto Rico and the U.S. Virgin Islands.

Services Include:

- Electrical and lighting repairs
- Nationwide rollouts
- Service upgrades and panel replacements
- New circuit installations
- Energy management systems installations
- Generator, switchgear and transformer installations and repairs
- Breaker maintenance and replacement
- Energy-efficient lighting upgrades and retrofits
- Group relamps and scheduled maintenance
- Occupancy sensors, timers and controls installations and repairs
- Electronic article surveillance (EAS) installation, removal and repair
- 24-hour emergency and on-demand service with prompt response

SEAM Group
1600 Boston-Providence Hwy
Boston, MA 02081

To learn more about our Maintenance Solutions, contact us at info@seamgroup.com

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

MAINTENANCE SOLUTIONS: WHERE RELIABILITY MEETS CONVENIENCE

For electrical repairs and installations, turn to experts you can trust to get the job done right for the right price. Rely on a company with the depth of knowledge to understand your business, the scale to meet your needs wherever you are and the relationships to keep your operations running smoothly.

WHAT MAKES MAINTENANCE SOLUTIONS DIFFERENT? ED BURKHART EXPLAINS:

OUR HYBRID BUSINESS MODEL:

"When clients work with us, they receive the best of both worlds—the convenience of working with a local contractor and the reliability of working with a global company. We both self-perform for clients as well as provide management of our local technician network to ensure that projects are done efficiently and professionally, but with more accountability and careful management than you would receive with other partners."

OUR COMPETITIVE PRICING:

"By having certified engineers and licensed professionals review quotes and challenge service technicians, we offer prices that are better than competitors. Through volume aggregation, we provide project management services that would otherwise fall on the customer and by acting as a single-source, total-solutions provider, we help clients minimize costs associated with working with multiple vendors."

OUR SUPPLIER RELATIONSHIPS:

"Our value-added relationships with suppliers are a key reason to work with Seam Group. By maintaining good relationships with both clients and suppliers, our personnel are well-equipped to act as an intermediary in any warranty-related dispute, and to mitigate losses for our clients."

OUR VENDOR ACCOUNTABILITY:

"Seam Group is committed to the satisfaction of our clients and committed to working with only the best sub-contractor partners as a result. We rigorously evaluate every one of our partners, factoring in metrics from every job completed."

OUR ONGOING COMPLIANCE APPROACH:

"Predictive Service employs field engineers, licensed supervisors and certified technicians to mitigate risk to your brand . We maintain ongoing vendor credentialing to ensure compliance with national and local regulations, and manage all of the proper licensures, liability insurance, references, and more."

OUR PREDICTIVE SERVICE ADVANTAGE:

"We offer what other electrical installation and repair companies can't, thanks to the multi-industry focus of Seam Group. We have patented technology and expertise to not only fix the problems you know about, but to locate and address potential issues cost effectively as well. Within the same company, we can offer predictive maintenance (PdM) services such as infrared inspections as well as our vast engineering solutions, including energy audits, lighting and facility assessments, building envelope and energy modeling."

Seam Group
1600 Boston-Providence Hwy
Boston, MA 02081

TURNKEY
INFRARED SOLUTIONS

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

ONE PURCHASE ORDER, ONE PROVIDER...NO WORRIES!

ADDITIONAL OPTIONS:

- Identification and installation of Infrared View Ports
- Installation of warning labels to comply with NEC 110.16
- Arc Flash Hazard Analysis Service and labeling for all qualifying electrical devices
- Infrared inspections of mechanical systems and building envelope
- Aerial inspections of flat roof structures

Identifying Issues is Only Half the Battle

Integrating infrared inspections into a proactive maintenance approach is more than protection against breakdowns, it's added peace of mind for your electrical system. Our comprehensive inspection service and management reporting tool provides a complete inventory of inspected assets detailing all problems found with recommended repair actions.

Our Total Program Includes Repairs

We provide a complete turnkey solution including electrical infrared inspection, identifying problems,to repair from a professional, licensed electrician. Infrared inspections without the hassle from a true, integrated provider!

Services Provided:

- Coordination and scheduling with the site's staff and the SEAM Group field team
- Infrared inspection of the entire electrical system (all components designated by the client)
- Opening and closing all the electrical panels and enclosures following NFPA 70E safety guidelines
- Complete inventory list of all assets inspected
- QR code on all assets for future identification
- Identification of all thermal problems found and detailed in our ViewPoint® software
- Analysis and recommended corrective action for all thermal problems
- Identification of all compliance or visual issues found
- Professional Licensed Electricians to repair all identified thermal problems and visual issues
- Update all corrective actions performed and close out of problems in the ViewPoint® system
- Complete cost benefit summary of all identified issues, individually and collectively

SEAM Group
Global Headquarters
25200 Chagrin Blvd.
Cleveland, Ohio 44122

To learn more about our PdM Solutions, contact us at info@seamgroup.com • 1.866.772.6770

ARC FLASH
HAZARD ANALYSIS

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

ARE YOUR EMPLOYEES AT RISK FROM ARC FLASH?

ANNUAL ELECTRICAL INCIDENCE STATISTICS:

- 35,000 non-fatal shocks
- 20,000 electrical shocks require a hospital stay
- 600 deaths occur due to electrical incidents

DID YOU KNOW?

There are fines associated with preventable electrical accidents which can add considerably to the costs of an arc flash incident with penalties of up to $500,000!

Every 30 minutes an electrical induced injury occurs in the work place causing severe injuries such as skin burns, respiratory damage, hearing damage, and eye injuries. These injuries occur in fractions of a second caused by an Arc Flash.

Major causes of arc flash are dust, mishandling of tools, accidental contact, condensation, equipment failures, corrosion or faulty installation.

An accident can cause your business unscheduled downtime, expensive repairs and replacement, personnel injury, death, as well as potential fines.

Our team of engineering professionals provide the following:

1. A schedule for onsite evaluation
2. Electrical Systems Equipment Assessment
3. Uncover potential correctable issues or problems within the electrical distribution system
4. Determine available short circuit current and interrupting time of each system device
5. Calculate the largest incident energy at the specified working distance for each system device
6. Calculate the Arc Flash boundary and hazard risk category
7. Determine the required Personal Protective Equipment (PPE) level
8. Document the results and generate labels to be placed on the equipment.

Benefits of an Arc Flash Hazard Analysis:

- Improves employee safety by adopting National Fire Protection Agency (NFPA) Standards
- Provides location-specific safety information to employees and contractors
- National Electrical Code (NEC) Article 110.16 code compliance

If you would like to discuss your situation with us or would like to schedule an Arc Flash Hazard Analysis, please contact us at
info@seamgroup.com • 1.866.772.6770

Seam Group
Global Headquarters
25200 Chagrin Blvd.
Cleveland, Ohio 44122

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

ENTERPRISE ASSET MANAGEMENT

seamgroup.com

EAM
ENTERPRISE ASSET MANAGEMENT

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

TOTAL CONTROL

The most effective and efficient combination of Industry leading experts, training, consulting, coaching, tools and processes for complete turn-key deployment of your maintenance & reliability program.

ISO 55000 COMPLIANCE

OUR APPROACH

Organized into the most successful deployment model and infused with lean principles, the complete Enterprise Asset Management approach creates a clear line of sight, quantifies value, and improves the system with focused solutions fused with lean methodology for rapid, sustainable step-change.

BASELINING – STRATEGIC DESIGN

PATHWAY
Awareness & Design

- Snapshot Assessments
- Master Strategy Design
- EAM Simulation
- PM Optimization Baselining
- WM Baselining
- Public Workshops

FOCUSED SOLUTIONS

BOTTOM LINE IMPACT

SEAM Group provides proven, quantifiable results in the shortest time. No matter what drives your EAM needs, we have everything required to exceed your maintenance and reliability objectives with sustainable organizational change.

REDUCE DOWNTIME
IMPROVE PRODUCTIVITY
ENHANCED ASSET PERFORMANCE
CULTURAL TRANSFORMATION
COST REDUCTION

866.772.6770 • Seam Group Global Headquarters, 25200 Chagrin Blvd., Cleveland, Ohio 44122 • seamgroup.com

EAM
ENTERPRISE ASSET MANAGEMENT

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

SERVICE / SOLUTIONS OFFERINGS

Life Sciences | Energy | Food / Beverage | Oil-Gas-Petro Chemical | Facilities | Manufacturing | Aerospace | Mining

BASELINING - STRATEGIC DESIGN

Develop your ultimate maintenance reliability program; one that will transform your entire system. Create obtainable goals identified through Baselining exercises which uncover opportunities and quantify the impact to business KPI's.

ASSET RELIABILITY

Prevent and eliminate equipment failures with a full array of program offerings including PM Development, PM Optimization, PdM design and deployment, FMEA, RCM, RCFA, Equipment Criticality, and Bill of Materials (BOM).

WORKFLOW OPTIMIZATION

Maximize maintenance system capability and drive craft productivity with a unique approach to tradition flow-based systems in need of optimization includes Future State workflow design, Maintenance organization structure, planning, scheduling and data management.

TPM - OPERATIONAL PARTNERSHIP

Push operational performance and optimize OEE (overall equipment effectiveness) to new levels. Maximize the effectiveness of optimum reliability partnership in TPM, OEE Optimization, Kaizen, 5S and Bad Actor Management.

ORGANIZATION

Organizations need to have clearly defined Mission, Vision, and Values. Program goals need to align with and support the business strategy. Roles and responsibilities need to be understood and how they tie in with the Mission, Vision, and Values of the organization. Performance metrics need to be reviewed and made part of the visual workplace.

MRO Material Management

Gain the necessary visibility to your MRO and storeroom. For most customers, spare parts have a profound negative impact on total MTTR while trying to balance cost. From organization, standardization, stocking strategies, ordering, receiving, usage and analysis, Predictive Service have effective processes that address material and supply chain needs for the maintenance organization.

CMMS

The computerized maintenance management system is at the heart of all effective maintenance and reliability programs. Get the most out of your CMMS system and align it to support your organization's mission and vision. Increase accountability, track performance, ensure compliance and identify savings through a fully optimized system.

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

PM OPTIMIZATION

TRANSFORMING PREVENTIVE MAINTENANCE STRATEGIES FOR HIGHER RELIABILITY AND EFFICIENCY

The numbers don't lie – PM Optimization delivers results:

- 15% Elimination of tasks which provide no value
- 80% Increase in more objective and data driven PM
- 40% Reduction of maintenance labor hours
- 50% Increase of required PM task coverage
- 35% Reduction in scheduled downtime hours for operations

How to fix the PM program and solve these glaring problems?

- What if there was a process to completely overhaul the PM's where all waste is removed, gaps are filled, addressing failure prevention at the component level and all tasks are pushed to the highest level of optimization, freeing up valuable labor hours? Good news...
- SEAM Group's robust process of eliminating what is not required, optimizing current activities and supplementing tasks to address gaps, takes your PM program to best-in-class status.
- Our total approach towards PM Optimization expands the focus beyond task optimization to a total program approach ensuring overall system change. The PM Optimization solution contains enhanced, proven tools that bring a new approach to an old problem. The tools and training are assembled, following our proven model for continuous improvement. Gaining control of your PM program requires a process not an activity.

Why Optimization?

- Beyond frequency (where many believe the problem resides), limitations can be found throughout the entire program; from how the PM's were created, copied, scheduled, subjectively executed, to the slowly-evolving program development. And then there are the problems with the tasks themselves.

PM Optimization is a top priority because of these common issues:

- Too many breakdowns and hearing "We just PM'd this"
- Emotional decisions add more layers to the PM
- Making equipment available for PM
- Taking the machines down to provide uptime
- Changing parts that are still good
- Having many problems coming "out" of a PM

TAKE THE FIRST STEP.
CONTACT US TODAY.

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

GAINING CONTROL
BEGINS WITH TAKING THE FIRST STEP

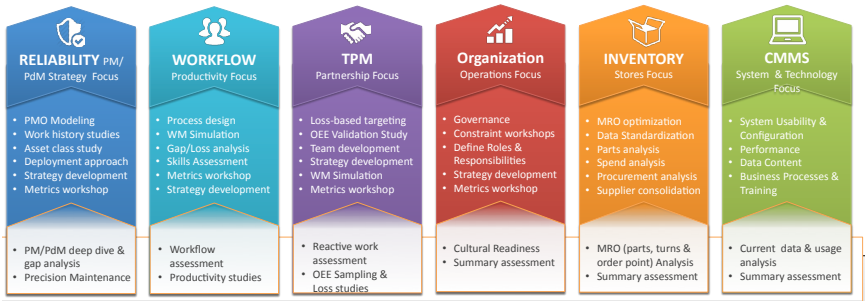
The Snapshot Assessment brings focus and clarity to your current state, as well as prioritize what to work on first, through a comprehensive cause and effect analysis.

The results bring awareness to the entire group and puts you in control of your improvement journey.

We use proven methods and strategies to get you on the right path.

It is a high-level assessment of all physical assets, human assets, systems, and processes to discover areas of strength and weakness. The assessment results provide the foundation for building a Strategic Asset Management Plan (SAMP)and to support a Lean Maintenance and ISO 55000 approach.

The snapshot assessment results uncovers a company's level of maturity around specific focus areas, including:



THE SNAPSHOT ASSESSMENT DELIVERS:

- Opportunities for improvements that result in greater operational reliability and performance
- Minimizing costs in labor, materials, outside services, and asset downtime
- Written reports with both short and long term opportunities for improvement
- Itemized qualitative scorecard
- Business case development

Benefits

- Comprehensive evaluatation of your maintenance and reliability program
- Benchmark your activities against industry averages and best practices
- Recognize opportunities to address cultural stumbling blocks
- Identify glaring or hidden operational gaps limiting your existing efforts
- Organize activities into projects by carefully analyzing causes and effects
- Assemble a results-driven strategy you can use immediately

TAKE THE FIRST STEP. CONTACT US TODAY.

Seam Group Global Headquarters, 25200 Chagrin Blvd., Cleveland, Ohio 44122 • 866.772.6770 • seamgroup.com

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

TPM STRATEGY

Modified Approach using Seam Group Nakajima Model

This document is a high level overview of our standard TPM Implementation & Deployment Model.

Our standard approach follows, The Nakajima's 12-step TPM model (see appendix A) which has been the benchmark in TPM since the mid 1980's. Since this is a relatively standard approach, other applications used from your past may resonate as these should all be consistent. Our master plan is a full-implementation where a company is at the initial stages of considering TPM but has not yet implemented.

For each phase of implementation, we have all of the training decks, forms, timelines, and materials designed for the site to become autonomous.

TRADITIONAL MODEL

Developing a Business Case for TPM

- Helping the site define TPM
- Educational campaign for site leadership
- Developing a business case for TPM as to its impact on Reactive Maintenance avoidance
- Optional: TPM Pilot project is full turn-key where our team, working with the site (but not training them) implements the Kaizen following our project plan
  - TPM site assessment
  - Gap analysis
  - Reactive maintenance preventable study
  - Report out
  - Optional (extra week): TPM Pilot Application

Site Preparation (infrastructure, policies, standards, tool confirmation)

Crucial to successful TPM deployment, the Site Leadership must form a TPM Steering Team with the primary responsibilities of setting the standards, expectations, measures and boundaries. In addition, they are charged with removing obstacles from local deployment teams. This is a very important and detailed portion of TPM.

- Form Steering Team Organization
- Strategic Deployment
- Promotional Campaign
- Performance Metrics
- Training Systems
- System Integration with Legacy Initiatives
- Developing a MOE Framework

Site Preparation (Coaching and assisting in action plan completion)

The gap analysis performed in Week 1 is used in Week 2 where site action plans are developed. In many cases, sites request that in addition to their autonomous activities, that Predictive Service assist in closing the gaps and keeping the momentum moving. This is optional but more times than not, is requested after the site struggles in keeping the schedule.

Internal Skills Development • Train the Trainer

The training and certification of internal deployment teams chartered with the responsibility of site implementation, management of Kaizen events and the training/certification of Operator skills for TPM. The team is trained and shown how to train others. In addition, training is conducted with the entire maintenance team to prepare them to support TPM and the work identification to closed loop feedback to operations.

- Project Management through Steering Team
- Operator Care Overview
- Developing TPM Activities
- OEE Overall Equipment Effectiveness
- 5S Workplace Management
- Maintainability/Accessibility – Visual Workplace Standards
- TPM Support Tools Application
- Conducting a TPM Kaizen Event
- Operator Certification

Deployment: Focused improvement (Kobetsu Kaizen)

This hands on Kaizen event follows the Kaizen project timeline spanning 4-5 days on selected asset. The event is deployed with the Deployment team co-facilitating alongside of Predictive Service. This phase includes preparing the department with proper Work Management protocol, preparing for the Kaizen event, conducting the Kaizen event, and establishing the sustainment elements of data collection, management and reporting. Because of the complexity of this phase, details can be found in the Project Timeline. The 7 steps in Autonomous Maintenance/Operator Care (Jishu Hozen) are followed including:

- Departmental Readiness Workshop
- Autonomous Maintenance (Jishu Hozen)
  - Initial Cleaning
    - Cleaning becomes inspection » Inspections reveal abnormalities » Abnormalities become restoration
    - Restoration becomes positive effects » Positive effects lead to pride in the workplace and ownership
  - Eliminate sources of contamination
  - Creation of a checklist for cleaning, inspections and lubrication standards
  - General Inspection
  - Autonomous Inspection
  - Organization and Housekeeping
  - Full Implementation
- Ongoing Continuation / Sustainment Program

Process Audits • Sustainment • Coaching

To ensure ongoing cultural transformation, a follow up week is designed to support the Steering and Deployment Teams. TPM process audits are conducted, performance metrics reviewed, action plans developed and as needed, coaching to optimize the Train the Trainer approach

- TPM Process Audits and Sustainment Assessments
- Performance, Site Targets and Metrics
- Action Plan Development
- Coaching as needed

APPENDIX A Nakajima TPM Implementation Model

TPM Implementation Phase	Implementation Step	Key Points	Actions
Preparation	1. Formally announce the decision to introduce TPM	• Top management announcement of TPM introduction at formal meeting and newsletter	• Top management TPM overview training • TPM case studies or pilot results • Top management buy-in • Top management commitment to TPM implementation
	2. Conduct TPM introductory education and publicity campaign	• Senior management group training • Slide-show overview presentation for management and for remaining employees	• Management training • TPM philosophy promotion to employees • TPM overview and management responsibility presentation to all management levels • Presentation of TPM overview to all employees
	3. Create a TPM promotion organization	• TPM Steering Committee and specialist subcommittees • TPM promotions office	• Create a TPM steering committee composed of top management representing all functions • Identify and staff a TPM promotional office reporting to top management. Promotion office to include a TPM coordinator, TPM facilitator(s), and a TPM content expert • Identify TPM champion(s) and their responsibilities • Determine mission and strategy • Include TPM in the business plan • Develop TPM step-by-step plan • Determine TPM education sourcing • Establish the TPM budget • Create TPM pillar subcommittees (chairman) • Train the TPM trainer • Pilot project training for supervisors and managers • TPM facilitator training (to include supervisors)
	4. Establish basic TPM policies and goals	• Set baseline and targets	• Determine TPM initiative objectives • Define TPM policies • Define OEE methodology and loss category definitions • Implement data collection system • Create OEE data reporting mechanism • Acquire data from the current source of data • Determine bottleneck (constraint) operations and equipment • Determine pilot project tool(s) • Select sponsor for pilot project • Determine the TPM compensation, reward, and recognition system
	5. Draft a master plan for implementing TPM	• Master plan from preparation stage to application for TPM prize	• Create the TPM sustaining plan • Define basic skills required • Training course development • Created a timeline (3-5 yrs) for each planned TPM activity in Steps 7 to 12
Introduction	6. Kick off the TPM initiative	• Master plan from preparation stage to application for TPM prize	• Top management presents the TPM policies, goals, and master plan to all employees • Ensure long-term commitment of the management team

APPENDIX A Nakajima TPM Implementation Model

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

TPM Implementation Phase	Implementation Step	Key Points	Actions
Implementation	7. • Establish a system for improving production efficiency • Focused Improvement Pillar • Autonomous Maintenance Pillar • Planned Maintenance Pillar • Education and Training Pillar	• Conduct focused improvement activities • Establish and deploy the autonomous Maintenance program • Implement the Planned Maintenance program • Conduct operation and maintenance skill training	• Team skills training • Problem solving skills training • Communication skills training • Business meeting skills training • Project management skills training • TPM process training • TPM activity board training • Establish cross-team communications • Structure team communication to management • OEE training • Launch team projects • Establish TPM process audits • Execute mid-project project progress reviews (progress, problems, plans, learning) • Establish and execute periodic team reports to management • Establish cost savings analysis (ROI) for team projects • Identify, demonstrate, and communicate contribution to customer success • Share success stories with other teams and management • Establish end-of-project reviews • Implement standard procedures and methodologies for Visual Controls and One Point Lessons • Renew and repeat cycle
	8. • Establish and deploy the Maintenance Prevention activities • Maintenance Prevention Pillar	• Develop optimal vertical startup for products, processes, and equipment	• TPM team training
	9. • Establish Quality Maintenance systems • Quality Maintenance Pillar	• Establish, maintain, and control conditions for zero failures, zero defects, and zero accidents	• TPM team training
	10. • Create systems for eliminating efficiency losses in administrative and logistic functions • Administrative Maintenance Pillar	• Increase production support efficiency • Improve and streamline administrative and office functions	• TPM team training • Proliferate throughout company
	11. Create the systems for managing health, safety and environment EH&S Pillar	• Create systems to ensure zero safety and environmental accidents	• TPM team training
Consolidation and Sustaining	12. Sustain full TPM implementation and continually improve the TPM process	• Raise TPM team goals • Establish ongoing audits • Apply for JIPM TPM Prize (optional)	• Review and raise the TPM team goals • Understand and attain JIPM TPM Prize criteria • Audit the TPM process

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

WHY IS ARC FLASH A UK LEGAL REQUIREMENT?

The Common Question from Facilities Management; "UK legislation hasn't changed, so why do we now need to consider this Arc Flash Hazard Assessment?"

UK LEGISLATIVE FRAMEWORK

The Main Law Is the Health and Safety at Work Act 1974 Section 2 includes:

- "it shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees."
- "the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health."
- "The provision of such information, instruction, training and supervision as is necessary to ensure, so far is reasonably practicable, the health and safety at work of his employees."

Section 3 Contains similar requirements but for non-employees that could be affected, therefore covering all persons within an installation.

The Underpinning Regulations Made Under the Act Include;

- Management of Health and Safety at Work Regulations 1999 Regulation 3
- Risk assessment (An Arc Flash Assessment is; A Risk Assessment of Incident Energy Levels which can occur in the system under all operating conditions)
- Additional exist within these regulations to ensure compliance is met with all relevant statutory provisions

Electricity at Work Regulations 1989 (EAWR 1989) Regulation 4

- Designed, constructed, operated and 'maintained' to prevent, so far as is reasonably practicable; danger
- Provision and use of work equipment regulations 1998 (PUWER 1998)
- Construction (design and Management) Regulations 2015 (CDM 2015)

REGULATIONS PARTICULAR TO ARC FLASH HAZARD

Management of Health and Safety at Work Regulations 1999

- **Regulation 3 – Risk Assessment**
  (a) The risks to the health and safety of his employees to which they are exposed whilst they are at work; and
  (b) The risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking.
- **Identify the Hazards**
  - Electrical arcing, flash-over and faulty equipment leading to short circuit energy is an obvious hazard this is also identified within EAWR 1989
- **It is a requirement to determine extent of harm**
  - An Arc Flash Hazard Survey details incident energy levels and directly tells us the extent of the potential harm which can be encoutered
- **Determine the likelihood that harm will occur**
  - Incidents can happen at any point in the local vicinity (boundary of the arc flash incident energy) not just during maintenance tasks.
  - However, most frequent incidents occur during switching and general preventative maintenance tasks.

WHY IS ARC FLASH A UK LEGAL REQUIREMENT? continued

Electricity at Work Regulations 1989

Key Definitions

- "Danger" means risk of injury
- "injury" means death or personal injury from electric shock, electric burn, electrical explosion or arcing or from fire or explosion initiated by electrical energy, where any such death or injury is associated with the generation, provision, transmission, transformation, rectification, conversion, conduction, distribution, control, storage, measurement or use of electrical energy

Regulation 4 is overarching regulation supported by the others, however, with regards to Arc Flash;

4.1 All systems shall at all times be of such construction as to prevent, so far as is reasonably practicable, danger Ð

- Understand power system design parameters – available fault current, incident energies, fault disconnection times, magnitude and rate of rising of voltages, load flow, etc. There is a direct requirement to understand your electrical system.
- Arc Flash Hazard Calculations come under the above regulation including the need for single line schematic drawings, short circuit data and protective device coordination studies.

4.2 As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far is reasonably practicable such danger

- Carry out maintenance in accordance with manufacturer's instructions and/or;
- Carry out maintenance in accordance with relevant benchmark standards e.g. BS 6626 (<=36Kv), BS 6423 (<=1Kv), BS 7671 (LV), BS 7430 (Earthing)
- Use predictive techniques – oil analysis, operating time testing, partial discharge (HV), Thermography (LV)... etc.
- Prioritise defects by risk
- Regular holistic review of results to determine the adequacy of maintenance strategy; amend as required.
- As with regulation 4(1) the requirements for understanding the system design parameters and potential hazards including Arc Flash Hazard is a requirement of EAWR 1989. Just because commissioning did not provide this information does not negate the need for it.
- Without understanding incident energy levels and flash over boundaries employees, non-employees are open to risk of injury from incidents because they are;
  - Not wearing the appropriate PPE
  - Present within a dangerous Arc Flash Boundary unnecessarily

4.3 Every work activity, including operation, use and maintenance of a system and work near a system, shall be carried out in such a manner as not to give rise, so far as is reasonably practicable to danger

- Have safe systems of work that meet the requirements of benchmark standards e.g. HSR 25, HSG 85, BS 6626, BS 6423
- Ensure all relevant personnel are trained and assessed as competent in the application of such safe systems of work
- Ensure all personnel that can "put people to work" are aware of the limitations imposed by the safe systems of work.
- PPE can support residual risk management – **It is not possible to select appropriate PPE without first understanding Arc Flash Hazards.**

WHY IS ARC FLASH A UK LEGAL REQUIREMENT? continued

4.4 Any equipment provided under these Regulations for the purpose of protecting persons at work on or near electrical equipment shall be suitable for the use for which it is provided, be maintained in a condition appropriate for that use, and be properly used.

- Arc Flash PPE to benchmark standards e.g. IEC 61842
- Arc Flash PPE of sufficient Arc Thermal Performance Value, to understand this an Arc Hazard Assessment is needed.
- Arc Flash Hazard Assessment determined in accordance with IEEE 1584
- PPE selection criteria readily available to users
- All distribution equipment should have clearly identified labels stipulating the minimum PPE required, and boundary zones identified on the floor

Information, instruction and training provided to all users together with competence assessment

SUMMARY

- Consideration and management of the Arc Flash hazard are clearly a requirement of all relevant UK legislation and always has been.
- Significant changes over the last ten years are that arc flash hazard control including assessments and their mitigation measures have become more available and therefore **PRACTICABLE** in the eyes of legislation. The international standard of **IEEE 1584** has significantly progressed this.
- The cost of implementing such measures has reduced considerably, therefore, has become more **REASONABLE**.
- Arc Flash Assessments are reliant on information which should already be in place for all UK installations. Generally, the substantial costs encountered with such studies are due to missing or incorrect information;
  - Single Line Schematic Drawings
  - Short Circuit Studies (already a requirement by above-detailed legislations)
  - Protection Coordination Survey (already a requirement by above-detailed legislations)
  - What may not have been practicable and reasonable in the past is today and therefore is reasonably practicable under current UK legislation.

SEAM GROUP

WHERE SAFETY & UPTIME ALIGN

seamgroup.com

THANK YOU

FOR ATTENDING OUR ANNUAL SALES MEETING

Beechmont Country Club • 29600 Chagrin Blvd, Cleveland, OH 44122