



LCE **LIFE CYCLE**[®]
ENGINEERING

Maintenance Management Certification (MMC)

Build and sustain a world-class Maintenance Program. You will learn practical skills that can be applied on the job right away, demonstrate your commitment to building a solid maintenance program, and increase your value to your organization.

This certification program will enable you to:

- Build and sustain a maintenance program
- Establish appropriate maintenance KPIs and visual management dashboard
- Select the optimum equipment maintenance strategy
- Implement work management strategies that improve asset availability and utilization
- Increase maintenance personnel productivity
- Build a problem-solving culture
- Manage an effective maintenance budget

To earn a Maintenance Management Certification (MMC), candidates must complete four courses and successfully pass the Maintenance Management Certification exam within three years.

Earn 9.5 CEUs.

Required courses:

- Managing Planning and Scheduling
- Maintenance Management Skills

Select two of the following electives:

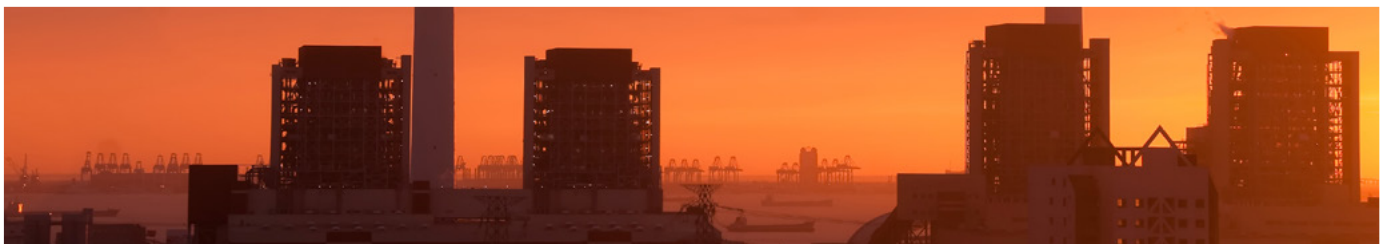
- Maintenance Planning and Scheduling
- Predictive Maintenance Strategy
- Risk-Based Asset Management
- Root Cause Analysis
- Materials Management

Who Should Attend

The Maintenance Management Certification is designed for maintenance managers and professionals responsible for building and sustaining a world-class maintenance program.



“ I have the appropriate tools and skill sets to push my company's maintenance program to become a world-class organization. ”



Reliability Engineering Certification (REC)

Secure knowledge and credentials from one of the world's largest and most respected engineering colleges. With the Reliability Engineering Certification (REC), reliability engineers will be well-equipped to reduce risk and increase the value that assets deliver to the triple bottom line.

The REC builds and certifies individual competency in reliability engineering and asset management. Successful candidates will be able to apply reliability engineering to build asset management programs that are consistent with ISO 55000 Asset Management standards.

Participants learn how to:

- Create Asset Management Plans that comply with ISO 55000
- Build and sustain a strategic reliability engineering program
- Prepare control strategies that reduce risk and improve utilization
- Design predictive maintenance strategies and programs
- Establish a root cause analysis program

The REC requires completion of four three-day courses*, and documented application of reliability engineering in the form of a capstone. Courses include:

- Reliability Engineering Excellence
- Risk-Based Asset Management
- Predictive Maintenance Strategy
- Root Cause Analysis

You will earn a total of 8.4 CEUs for all four courses.

Reliability Engineering Certification Capstone

This requirement demonstrates reliability engineering competency through documented workplace application. The work product includes:

1. Criticality ranking
2. FMEA
3. RCA
4. Proposed predictive maintenance
5. Presentation and defense

Who Should Attend

The REC is for people who are responsible for improving asset and capacity reliability, decreasing repetitive failures, building sustainable predictive maintenance programs, and creating a culture of continuous improvement.



REC capstone projects more than pay for the program.

An automobile parts supplier saw a 60% reduction in down time.

A candy manufacturer identified and eliminated a failure, saving the company \$325,000 in parts alone over a six-year period.



Achieve your Maintenance Planning and Scheduling Certification (PSC)

You will learn practical skills that can be applied on the job right away, demonstrate your commitment to building a solid maintenance planning and scheduling program, and increase your value to your organization.

This certification program will enable you to:

- Build and sustain a maintenance planning and scheduling program
- Move your organization from a reactive to proactive environment
- Apply work planning best practices
- Calculate work management performance metrics
- Develop a comprehensive “standard” job plan
- Develop governing principles and standard procedures for CMMS data entry and use
- Describe a disciplined approach to managing work for a planned shutdown
- Develop an audit and continuous improvement strategy for the planning program

To earn a Maintenance Planning and Scheduling Certification (PSC), candidates must complete four courses and successfully pass the certification exam within three years.

You will earn a total of 8.4 CEUs for all four courses.

Required courses include:

- Managing Planning and Scheduling
- Maintenance Planning and Scheduling
- Materials Management
- Planning for Shutdowns, Turnarounds and Outages

Who Should Attend

The Maintenance Planning and Scheduling Certification is designed for planners, schedulers, maintenance managers, production supervisors and professionals responsible for building and sustaining a world-class maintenance planning and scheduling program.

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KANSAS



Maintenance Management Skills



Maintenance Management Skills teaches supervisors how to lead a world-class maintenance department using planning and scheduling best practices to drive work execution, and motivational and time-management techniques to improve maintenance worker productivity. The result is improved staff motivation, lower employee turnover, increased output and reduced waste of resources.

Participants will build an action plan for managing their human capital while developing an effective program for managing assets. Supervisors will learn how to leverage their personal supervisory style, apply time management techniques, run effective meetings and improve maintenance delivery. Explore how to make the transition from a technician to a supervisor and investigate common supervisory staffing issues like supervising friends, orienting new employees and delegating responsibility when necessary.

This three-day course uses case studies, group discussion, reflection activities and exercises to help you apply what you learn to your work situation.

Who Should Attend

This course is designed for maintenance managers and supervisors. Ideal candidates either supervise maintenance workers or manage maintenance through supervisors. This course is also recommended for people looking to improve their skills, or those being considered for advancement. Supervisors from other related areas such as Operations, Warehouse and Housekeeping can also benefit.

Learn How To

List the roles, goals and motivation of a Maintenance Supervisor

Describe maintenance management critical success factors:

- Using planning and scheduling to drive work execution
- Techniques to improve worker productivity
- Managing meetings effectively

Practice techniques to effectively manage people:

- Methods to handle problems with employees, vendors, coworkers
- Decision making
- Smart delegation
- Supervisory staffing issues: orientation, discipline, supervising friends, and substance abuse issues

Build a management skills action plan:

- Assess your supervisory style to identify strengths and areas for development
- Apply time management techniques
- List ways to control reactions and make good decisions in times of stress
- Outline ways to make the change from technician to supervisor

Outline an effective program to manage your assets

- Best practices for applying preventive maintenance, predictive and condition-based technologies
- Guidelines for assessing your existing PM system and making improvements

What our Students are Saying:

“ LCE rejuvenated my enthusiasm as well as provided key fundamentals that I was seeking.

Patrick Banister,
Nektar Therapeutics



This course is one of seven courses that can be applied to the Maintenance Management Certification program.

Maintenance Planning and Scheduling



Maintenance planning and scheduling is one of the fastest and most effective investments an organization can make to improve productivity and availability. The processes in this course pave the way for planning and control of maintenance resources. Equipment reliability is increased. Waiting times, unnecessary parts and inaccurate information are eliminated. Budgeting is easier and more accurate. Maintenance tasks are as much as 50% more efficient in terms of costs and time.

Maintenance Planning and Scheduling examines topics including a proactive work management process, job estimation and prioritization, backlog management, job plan development, work scheduling and coordination, tracking progress, and supporting reliability engineers with valuable equipment history and root cause analysis input.

Who Should Attend

Successful maintenance planning and scheduling programs require the disciplined application of proven processes and interdepartmental partnerships. It is important for departments that are influenced and impacted by the processes to understand the processes. People in the following roles should participate in this training:

- Maintenance Planner/Schedulers
- Production Supervisors
- Storeroom Managers
- Maintenance Managers
- Operation Coordinators
- Maintenance Supervisors
- Plant Engineers

Learn How To

Outline a proactive work management process

Calculate work management performance metrics

Develop a comprehensive "standard" job plan

Apply work planning best practices:

- Identifying work and submitting work orders
- Prioritize work using equipment criticality (RIME)
- Backlog management
- Estimating work
- Effective job plans
- Job kitting

Summarize requirements for work management support systems:

- Equipment data and history
- Work order system
- Standard job plans and job libraries
- Bill of materials
- Technical library

Build a schedule using best practices:

- Master schedule
- Schedule constraints
- Schedule balance and leveling
- Coordination meetings

Develop key partnerships needed for effective maintenance planning and scheduling

Differentiate maintenance types and how they impact the planning/scheduling efforts

Online Access

Participants will receive 90 days of access to eMPS! With eMPS, you can refresh your skills and gain access to over 40 helpful tools and resources on your computer, tablet and smartphone whenever you need them.



This course is one of seven courses that can be applied to the Maintenance Management Certification program.



This course is required for the Maintenance Planning & Scheduling Certification program

Managing Planning and Scheduling



In Managing Planning and Scheduling, participants build a work management program based on Reliability Excellence best practices. The course is designed for a Lead Planner or Department Manager to establish a proactive work management program or to transform an existing program into an effective, results-producing department that positively impacts maintenance costs, plant reliability measures and employee morale.

Managing Planning and Scheduling examines topics like designing a work management program strategy, developing standard processes and work, establishing program measures, managing staff development, and planning program improvement. Learners will walk away with a solid foundation for an effective maintenance work management program.

Who Should Attend

People in the following roles should participate in this training:

- Lead and senior planners
- Planning Department Managers
- Maintenance Managers
- Reliability Change Agents
- Reliability Managers
- Continuous Improvement Managers

Online Access

Participants will receive 90 days of access to eMPS! With eMPS, you can refresh your skills and gain access to over 40 helpful tools and resources on your computer, tablet and smartphone whenever you need them.

Learn How To

Explain the business case for proactive work management

Build a work management process flow chart and responsibility matrix

Draft a work management program strategy: objectives, key performance measures, targets, reporting and monitoring methods

Develop governing principles and standard procedures for CMMS data entry and use

Outline a management of change process for job plans

Describe a disciplined approach to managing work for a planned shutdown

- Scoping and validating work, project management, communication, reviews, lessons learned

Develop an implementation plan to establish or transform a planning program, including:

- Establishing program standards and templates
- Incorporating visual management into your program
- Job performance feedback and continuous improvement
- Backlog management
- Managing the people side of change (change management)

Develop an audit and continuous improvement strategy for the planning program

- How trends in manufacturing and technology impact planning/scheduling
- How the planner interacts with failure data and root cause analysis efforts
- How equipment criticality and risk management influence maintenance strategy

Build performance management and development strategies for planning personnel

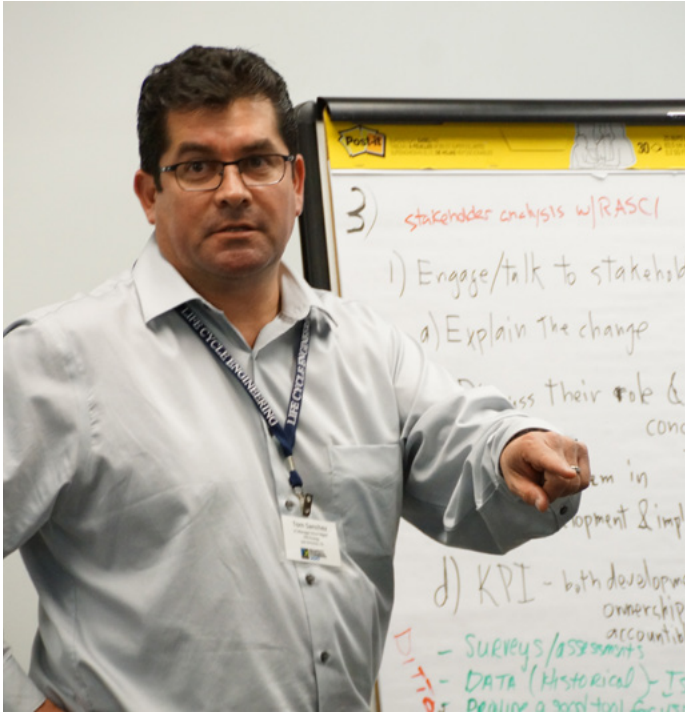


This course is required for the Maintenance Management Certification program.



This course is required for the Maintenance Planning & Scheduling Certification program.

Materials Management



Managing a storeroom is a balancing act. Storeroom managers must have the materials available to keep production flowing while minimizing inventory investment.

In this three-day course, you will learn how to ensure the right parts are in the right place at the right time. When you apply the knowledge and skills learned in this class, quality will increase and costs will decrease. You will be able to manage your storeroom in a way that successfully balances the needs of operations and maintenance while optimizing your inventory and carrying costs.

Who Should Attend

Anyone involved in materials – directly or indirectly – will find value in Materials Management, including:

- Materials Managers
- Maintenance Manager
- Purchasing
- Storeroom Personnel
- Planner/Schedulers
- Operations Managers

Learn How To

- Discuss the materials management challenges that organizations are facing
- Identify the elements of materials management
- Discuss how materials management fits into the overall umbrella of Reliability Excellence
- Discover the characteristics and steps involved in effective materials management processes
- Discuss the basic steps involved in implementing effective inventory control best practices
- Summarize the basic steps involved in implementing effective warehouse management best practices
- Describe how a CMMS can support materials management processes and best practices
- Identify contributors to total cost of materials
- Practice techniques to manage inventory investment
- Define the standard set of basic materials management key performance indicators
- Develop an inventory/investment management action plan

Online Access

Participants will receive 90 days of access to eMRO! With eMRO, you can refresh your skills and gain access to over 40 helpful tools and resources on your computer, tablet and smartphone whenever you need them.



This course is one of seven courses that can be applied to the Maintenance Management Certification program.



This course is required for the Maintenance Planning & Scheduling Certification program

Predictive Maintenance Strategy



Condition-based maintenance is a philosophy that uses the equipment's operating condition to make data-driven decisions and improve quality, productivity and profitability. Unlike industry courses that focus on applying specific predictive technologies like vibration monitoring or oil analysis, this course focuses on establishing, managing and sustaining results from a comprehensive condition-based program.

The course considers predictive maintenance and other techniques as a component of a larger asset maintenance strategy to diagnose, prevent and postpone failures. You will learn the theory and application of multiple PdM technologies. You will review critical success factors of results-producing programs. Through group activities and case studies, you will determine which technologies to use, how to set goals for your program, track progress and practice how to communicate results to different stakeholders. By the end of the session, you will have outlined what a successful condition-based program can look like at your organization.

Who Should Attend

Maintenance Managers, PdM Managers, Maintenance professionals, continuing education students, and any person responsible for justifying or managing duties related to a condition-based monitoring program.

Learn How To

- Explain how applying a combination of maintenance strategies mitigates risk and optimizes your asset maintenance plan
- Define the purpose and benefits of condition-based maintenance
- Describe how predictive maintenance enables proactive maintenance planning and scheduling
- Explain how to use risk mitigation to establish a condition-based maintenance program
- Make a business case to justify a condition-based maintenance program investment
- Summarize benchmarks and trends in the predictive and condition-based maintenance disciplines
- Summarize prevalent condition-based technologies in use today
- Describe the role of Precision Maintenance in a Condition-based Maintenance program
- Report program results: reliability improvements and financial value
- Draft program action plan that incorporates critical success factors in the following areas:
 - a. Program objectives
 - b. Application: technology, techniques and equipment
 - c. Measures
 - d. Infrastructure and resources
 - e. Organizational support



This course is one of seven courses that can be applied to the Maintenance Management Certification program.



This course is one of the four courses that lead to the Reliability Engineering Certification program.

Reliability Engineering Excellence



Learn how a Reliability Engineer (RE) drives the value assets can deliver by overseeing equipment life cycle performance from concept through disposal. In Reliability Engineering Excellence, REs learn to build a business case for reliability, design reliability into a system or process before it's built, identify operating risks and solve problems in all areas of asset management. Life Cycle Institute reliability experts facilitate class activities around system reliability modeling, ISO 55000-based assessment questions and how to use leading and lagging indicators to manage a reliability program. Class participants examine the major components of an asset management plan, justify a capital project and discuss asset data management concerns.

By the end of this course you will be equipped to build and sustain a strategic Reliability Engineering program to achieve your organization's reliability goals. Special emphasis will be placed on designing for reliability, life cycle asset management, life cycle costing, reliability and statistical analysis, measuring reliability program improvements and building organizational support for reliability.



This course is one of the four courses that lead to the Reliability Engineering Certification program.

Who Should Attend

Ideal for those involved in asset reliability, capacity and predictive maintenance programs. Anyone responsible for decreasing repetitive failures and seeking investments to improve plant reliability, including reliability engineers, reliability technicians and reliability personnel.

Learn How To

- Define how reliability impacts business performance
- Describe the reliability engineer role and responsibilities
- Define the main components of an asset information system
- Use different reliability tools and models to examine reliability
- Explain the components of an asset management plan
- Describe how sustainability principles can be applied to asset management planning
- Assess the efficacy of your organizational support structure for asset management and build a plan to address gaps
- Assess internal asset management capabilities and develop a plan to address gaps
- Explain how to hold external suppliers accountable for asset management capabilities
- Create a business case to support reliability investment options

What our Students are Saying:

“ I will utilize the RFD and FMEA tools immediately in my current program.

Andrew Gillott,
Cargill

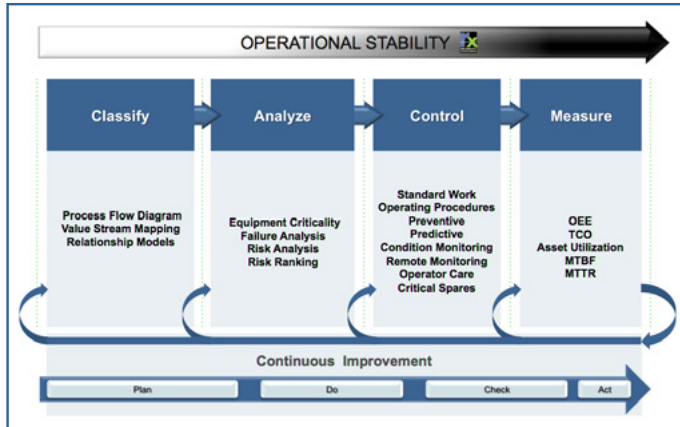
“ The daily discussions and activities helped me think of some new ways to attack issues at my company.

Reed Watson,
Noble Drilling Services Inc.

“ One of the best trainings I have completed in my professional development.

Sam Walker,
Nektar Therapeutics

Risk-Based Asset Management



Explore how to improve asset availability and meet reliability goals by applying a risk-based approach to asset maintenance and operations. In the Risk-Based Asset Management (RBAM®) course, you practice how to prioritize reliability efforts on critical equipment and failures that impact your operation. RBAM incorporates reliability-centered maintenance (RCM) principles and continuous improvement practices like PDCA to position your program for decreased downtime, lower maintenance expenditures, and an acceptable total cost of ownership.

During the course, participants classify and analyze assets and failures to rank equipment criticality and draft a risk plan. Next, learners build a failure mode and effects analysis (FMEA) to define control strategies and populate an equipment maintenance plan. Group activities in the class include examining how life cycle cost influences investment and choosing key performance indicators to manage a reliability program. Specific emphasis will be placed on the resources needed to create an asset management plan - a risk, maintenance and asset operations plan - that can manage the entire life cycle of an asset.

Online Access

Participants will receive 90 days of access to eRCM! With eRCM, you can refresh your skills and gain access to over 40 helpful tools and resources on your computer, tablet and smartphone whenever you need them.

Who Should Attend

This is ideal for people responsible for the design, installation, commissioning, operation and maintenance of capital assets and auxiliary equipment. This includes project engineers, reliability engineers, maintenance managers, operations managers, and engineering technicians.

Learn How To

- Draft components of an asset management plan
- Describe what an asset management organization needs to know to manage risk and improve performance
- Describe the four phases in a risk-based asset management model
- List ways to extend the life of assets and evaluate their effectiveness
- Use a failure mode and effects analysis (FMEA) to analyze risks and map control strategies to failure modes
- Describe how audits, reviews and key performance indicators drive continuous improvement
- Practice applying a standard process for preventive maintenance optimization
- Select the optimal strategy for renewal or disposal based on asset management strategy

What our Students are Saying:

“ My experience at the Life Cycle Institute was wonderful. The content was highly applicable to my job, the facilitator did a fantastic job of providing relevant and interesting examples and the hospitality was great as always.

Michael Atwood,
USS-POSCO

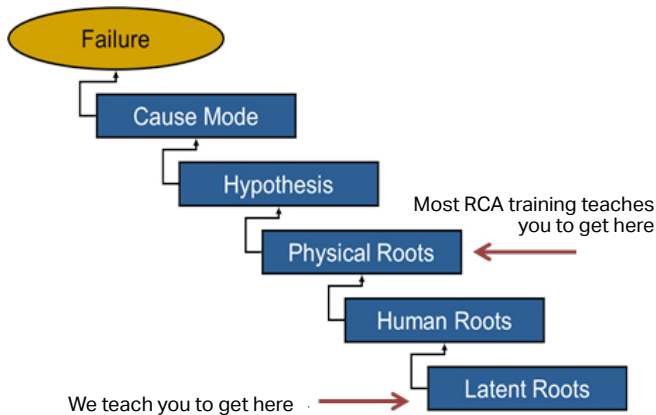


This course is one of the four courses that lead to the Reliability Engineering Certification program.



This course is one of seven courses that can be applied to the Maintenance Management Certification.

Root Cause Analysis



Armed with what you learn in this course, you will apply a process for root cause analysis, establish a culture of continuous improvement, and create a proactive environment. Learn to ask the right questions, establish triggers that drive you to the RCA process, and perform cost-benefit analysis.

Learn How To

Investigate the RCA methods

- Discuss the various RCA philosophies and methodologies
- Discuss the importance of a true RCA process
- Discuss why multiple solutions are important

Develop your RCA program

- Develop a systematic way to define and analyze a problem while determining and implementing solutions
- Outline triggers for the RCA effort based on business case thinking
- Identify roles, goals and responsibilities within your organization
- Create a "Straw Man Template" RCA process for your facility

Prepare to implement the RCA process

- Recognize the importance of the change management component in your RCA implementation
- Use the Root Cause of Success (RCS) process to eliminate common implementation issues
- Choose proper corrective actions and follow-up processes for various situations
- Use proper documentation, including incident reporting and the A3 process

Discuss the advantages and disadvantages and know when to apply PdM technologies

Manage and be able to effectively use 8 RCA tools

- Event and Causal Analysis
- Change Analysis
- Fault-Tree
- Design/Application Review
- Sequence-of-Events
- FMEA
- 5-Why
- Cause and Effect

Who Should Attend

Anyone interested in acquiring or improving advanced problem-solving skills will benefit from this course. Individuals responsible for continuous improvement, solving maintenance and reliability problems, and preventing future occurrences of equipment and system failures, including technicians, engineers, supervisors and managers.

What our Students are Saying:

“ Everything was great. Course content was clear and easy to understand. Instructor is very knowledgeable about RCA and related subject matter and willing to assist in any way possible to inform and educate.

Brad Cary,
Sealed Air Corporation

“ Life Cycle Institute's facilitators are truly subject matter experts. I feel confident in taking what I learned to my boss and peers.

Mickey Kennedy,
Special Metals Corporation



This course is one of the four courses that lead to the Reliability Engineering Certification program.



This course is one of seven courses that can be applied to the Maintenance Management Certification program.

Live, Virtual Classes

Virtual, Instructor-Led Training (VILT) combines the benefits of traditional classroom training and online learning. It allows participants to have the experience of live instructor-led training without having to go to a classroom or have the instructor present in person.

This video-based training allows learners to ask questions, participate in discussions, and get trained together irrespective of their location. Participants in the Institute's virtual classes will learn the same content from the Institute's in-person classes while participating in professionally facilitated sessions with activities that stimulate participation and learning:

- Online breakout sessions with facilitator support
- Individual and group assignments and discussions
- Polls, Q&A, and online whiteboard activities that keep learners engaged

Life Cycle Institute's virtual classes were developed by industry-leading subject matter experts and certified professional instructional designers with experience converting live, instructor-led classes into engaging and effective online learning experiences using learning best practices.

Certification

The virtual classes will entitle participants to the same CEUs as in-person classes and will also count toward their Reliability Engineering Certification, Planning and Scheduling Certification, or Maintenance Management Certification.

Course materials

You'll receive all materials electronically. During the course you'll have access to any materials you need. Since they're in digital format, you'll be able to easily download and save them so you don't have to worry about losing a workbook!

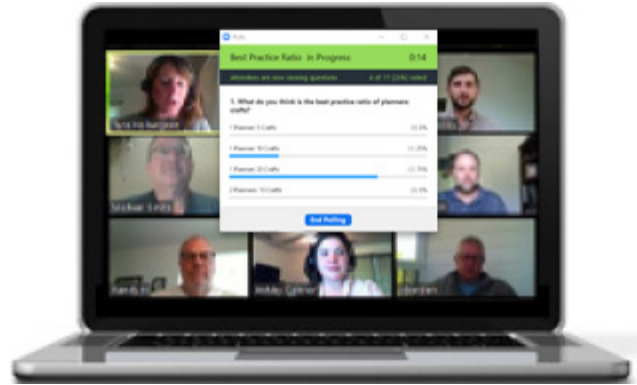
Private Virtual Classes

We can convert any of our courses into a virtual format to deliver a training solution that fits your needs.

What our Students are Saying:



I prefer virtual learning over learning on site. I do not like to travel so the virtual classes really help me get the training I need without having to travel across the country.



Life Cycle Institute's 3A Learning® Process

Learning is Change. Change is Learning.® Today's competitive advantage goes to those who can learn and adapt faster. High Impact Learning integrates learning, leadership and change management competencies to produce documented, sustainable results.

A hot topic in the learning community is return on investment (ROI). The goal is to provide evidence for changing policies and practices to support investments in people. How do organizations know where to invest their training dollars?

Organizations need to abandon event-based thinking and adapt to performance-based thinking. High Impact Learning does that by encouraging leadership involvement and applying retention strategies that ensure learning is not only an event but a true process that changes behavior and performance. This is achieved by implementing 3A Learning: Align, Assimilate & Apply.



Alignment Phase

Before participating in a learning event, participants should have a thorough understanding of what they are expected to learn, how their behavior is expected to change, the results they are expected to achieve, and how these results contribute to the overall goals of the organization. To help meet these expectations, the use of learning objectives and Learning Impact Maps are crucial.

Well-developed learning objectives are the foundation of a successful learning intervention. These objectives should be measurable and define the action a participant will be able to take post-training.

A Learning Impact Map is a simple tool used to identify if the training can achieve the desired results, prepare participants to learn and change behavior based on the training, and link the desired behavior with organizational performance and business goals.

Assimilation Phase

During the learning event, the focus is on assimilating the learning that resonates best with the participant. An effective learning event will engage participants to apply what they already know in building relevant skills and knowledge that they can focus on and practice during the class. An effective learning event should be participant-centered, include adult learning principles, be led by effective facilitators and incorporate a Learning Impact Map.

Application Phase

Applying what one has learned is where 80% of learning takes place. The Application phase involves using the skills and knowledge within the work environment that makes the learning stick, causing a behavior change that produces desired results. During this phase the Learning Impact Maps are used to reflect on the original goals and note any new-found knowledge. Video Apply Phase

Follow-through is an important step in the learning process as it encourages participants to take action, solicit feedback, and continue collaborative learning for up to three months after the learning event.

Results

Training delivers maximum results when a class inspires retention, management is involved, a Learning Impact Map is documented and a follow-through plan is in place. A High Impact Learning program can help you bring these elements together for an educational experience that changes behavior to achieve personal and organizational goals.

Facilitators Make the Difference



Life Cycle Institute class leaders are called facilitators. This acknowledges that in addition to being experienced authorities on their topic, they have a passion for teaching and have developed this passion into a set of learning facilitation skills.

Even though we call them facilitators, they are really both a facilitator and instructor, and can apply either style based on participant needs and the learning objectives.

Life Cycle Institute facilitators complete a rigorous qualification process and are continuously engaged in activities that enhance their effectiveness at facilitating learning.

Some of the competencies demonstrated by Life Cycle Institute facilitators include:

- Learning about the participants and adapting the learning objectives and content to meet their needs
- Engaging everyone in low-risk daily starters and frequent active reviews related to the content
- Using adult learning principles that enhance motivation and improve retention
- Actively involving the participants every eight to 15 minutes
- Using redirected and reverse questions to engage all participants
- Setting up exercises, case studies, games, and simulations by giving clear directions and drawing out reactions and learning points

What our students are saying about our facilitators:

“ The facilitator kept me engaged and interested at all times.

Allen Jones,
Boeing

“ The facilitator demonstrated excellent knowledge and understanding of the subject matter.

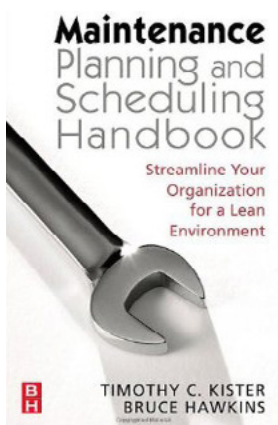
Tony Geary,
Alcoa

“ Great instructor. Lots of interaction, not death by PowerPoint.

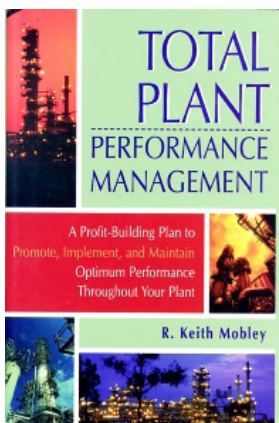
Steve Gardner,
US Army Corps of Engineers

“ The instructor’s knowledge obviously came from first-hand experience. It is easier to relate to someone who has been there, done that and knows how plants really operate!

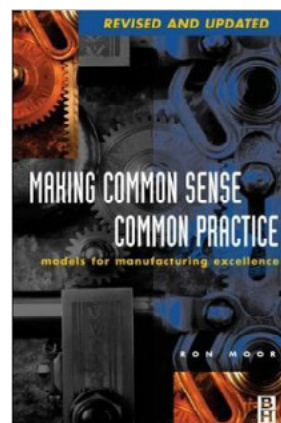
Chris Gross,
North American Stainless



Tim Kister



Keith Mobley



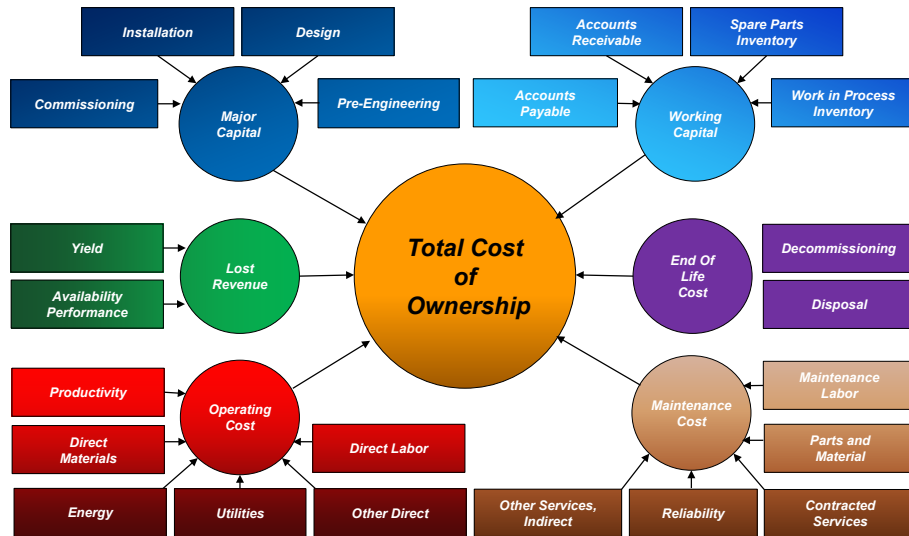
Ron Moore

LCE's Approach to Asset Performance Improvement

LCE's core competency is helping clients optimize their industrial assets. Whether these assets are new greenfield or existing brownfield facilities, LCE's resources, systems, and work processes are all focused on reducing operating costs while improving equipment reliability and plant availability.

The following model illustrates the key elements that impact total cost of ownership and optimum asset performance:

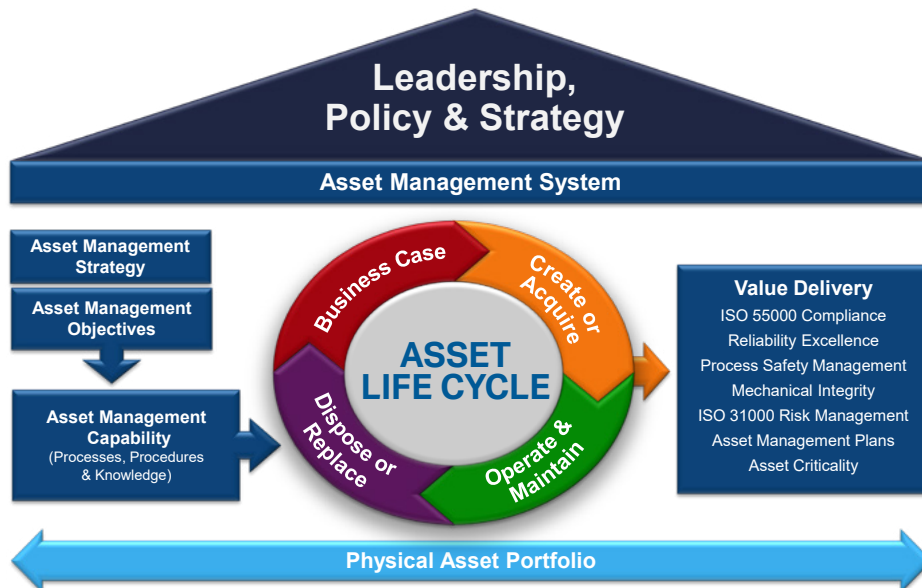
Maximizing the Total Return Over the Asset Life Cycle



Pre-plant design impacts up to 80% of the life cycle cost. Once the design is complete and the equipment ordered, the ability to influence the life cycle cost of a plant or operation is dramatically reduced. Only about 15% of the life cycle cost can be influenced by operating and maintenance best practices.

This figure shows all of the interrelated components of Total Asset Management Strategy and Deployment.

Life Cycle Engineering's Asset Management Implementation Framework



Reliability Excellence for Existing Plants and Facilities

Our PoweredByRx® approach combines reliability consulting, engineering services and education. Using a “diagnose before prescribing” philosophy we match solutions to our clients’ needs, including holistic transformations based upon our Reliability Excellence Model, targeted reliability and asset management services necessary to resolve specific tactical issues, and change management services vital to the success and sustainability of most initiatives.

Reliability Excellence® Model

SUSTAINABILITY							
Performance Management	Audits & Assessments	Equipment History	Equipment & Process Design	Work Measurement	Management Reporting		
OPTIMIZATION							
Reliability Engineering	Management of Change	Information Management	Supervision	Organizational Behavior	Procurement	Facilities & Equipment	
PROCESSES							
Work Management	Work Planning	Work Scheduling	Operator Care	Asset Care	Loss Elimination	Workforce Development	Materials Management
CULTURE							
Governing Principles	Goals & Objectives	Organizational Structure	Budgeting & Cost Control	Occupational Health & Safety	Employee Involvement		
PRINCIPLES							
Management Commitment				Functional Partnership			

Services

© Life Cycle Engineering

Our approach to Reliability Excellence creates the transparency to identify risk and develop plans to manage and reduce it. Most important, of course, is safety. Research indicates there is strong correlation between reliability and safety. As a facility becomes more reliable, the number of safety incidents declines. Our approach helps clients reduce risks across the board – risks to health, safety, the environment and production.

We help our clients improve performance by assisting them with holistic transformations or targeted reliability and asset management services to resolve specific tactical issues. The goals and results are different for each client. Improved performance is documented in results like reduced cost, improved capacity, reduced downtime, improved OEE, increased asset utilization, and improved margin.

Because no improvement effort can be successful without the support of the people involved, we help our clients engage employees in the effort to improve reliability and organizational performance. We not only help our clients identify what needs to change to achieve better results, we also help them understand how to change.

About Life Cycle Engineering



More than 2,000 clients have leveraged the knowledge and experience of LCE's subject matter experts to improve economic performance of their asset-intensive manufacturing and processing plants, mining operations, energy generation plants, and education and health care facilities. The culmination of 40 years of application, more than 500 years of combined subject matter expert experience, and thousands of successful implementations in govern-

ment and the private sector uniquely positions LCE as a leader in performance improvement. LCE's proprietary, holistic, data-driven approach enables clients to achieve leadership positions in their core businesses, leverage their core strengths to grow adjacent opportunities, and operate at superior performance levels that drive industry-leading results.

Life Cycle Engineering (LCE) was founded in 1976 by two civil service engineers working for the government in Washington, DC. They worked directly with the United States Navy to pioneer the application of reliability engineering – and specifically predictive technologies and condition monitoring – to be used in nuclear submarines.

Today, LCE is a privately held company with headquarters in Charleston, South Carolina, providing engineering solutions for private industry, public entities, government organizations and the military, in North America and around the world.



Life Cycle Excellence helps large, asset-intensive companies improve operational performance. Improving productivity of your assets requires understanding where your current systems are underperforming, developing processes and capabilities to close performance gaps, and creating a culture that supports continuous improvement. Our experience helping hundreds of clients ranges from multi-site, organizational transformations to diagnosing and fixing a specific production line problem.

Our team includes subject matter experts in a variety of disciplines from reliability engineering to planning and scheduling to lean /Six Sigma. All of our consultants hold an advanced degree or an accreditation within their profession and are certified Prosci® Change Management Professionals.



Life Cycle Institute is LCE's human performance practice that integrates learning, change management and project management. Institute offers 16 courses attended by more than 1200 students from more than 200 companies each year. In addition to individual courses, Life Cycle Institute offers university-backed certification programs in Reliability Engineering and Maintenance Management. Our university partners include Clemson University, The Ohio State University, and University of Kansas.



Who We Are

COURSE	WHO SHOULD ATTEND	YOU WILL LEARN HOW TO	DATES & LOCATION	DAYS/CEUS	COST
Maintenance Management Skills	Maintenance Managers and Supervisors, as well as Supervisors from Operations, Warehouse or Housekeeping areas	Lead a world-class maintenance department using planning and scheduling best practices to drive work execution, improve productivity, motivate staff, increase output and reduce waste.	Dec 7-9, 2021 (CHS) Apr 12-14, 2022 (Virtual) Jul 12-14, 2022 (CU)	3 consecutive days 2.1 CEUs	\$1,895
Maintenance Planning and Scheduling	Maintenance Planner/Schedulers, Production Supervisors, Storeroom Managers, Maintenance Managers, Operation Coordinators, Maintenance Supervisors	Apply preventive and predictive maintenance practices. Calculate work measurement. Schedule and coordinate work.	Dec 7-9, 2021 (CHS) Feb 1-3, 2022 (CHS) Apr 5-7, 2022 (Virtual) Jun 21-23, 2022 (CHS) Aug 23-25, 2022 (CHS)	3 consecutive days 2.1 CEUs	\$1,895
Managing Planning and Scheduling	Lead and Senior Planners, Planning Department Managers, Maintenance Managers, Reliability Change Agents, Reliability Managers, Continuous Improvement Managers	Establish a proactive work management program or transform an existing program into an effective, results-producing department that positively impacts maintenance costs, plant reliability measures and morale.	Nov 2-4, 2021 (OSU) Mar 15-17, 2022 (WSU) May, 10-12, 2022 (KU) Jul 19-21, 2022 (CHS)	3 consecutive days 2.1 CEUs	\$1,895
Materials Management	Materials Managers, Storeroom Managers, Planner/Schedulers, Maintenance Managers and Operations Managers	Apply sound storeroom operations principles. Manage inventory to optimize investment. Understand the role of purchasing. Implement effective work control processes.	Oct 26-28, 2021 (CHS) Mar 1-3, 2022 (Virtual)	3 consecutive days 2.1 CEUs	\$1,895
Planning for Shutdowns, Turnarounds and Outages	Members of the shutdown or outage teams, Planners, Plant Engineers, Maintenance Engineers	Save time and money on your next shutdown by learning how to effectively plan for and manage such large projects. Learn processes and strategies for optimal resource allocation.	Feb 15-17, 2022 (Virtual) Aug 9-11, 2022 (CHS)	3 consecutive days 2.1 CEUs	\$1,895
Predictive Maintenance Strategy	Plant Engineers and Managers, Maintenance, Industrial and Manufacturing Engineers, Maintenance Supervisors and Managers	Establish, manage and sustain results from a comprehensive condition-based program. Explore the theory, application and program best practices of multiple PdM technologies, including vibration analysis, thermography, oil analysis, ultrasound, motor circuit analysis and other condition-based monitoring techniques	Nov 2-4, 2021 (KU) Jan 18-20, 2022 (Virtual) Mar 29-31, 2022 (CHS) May 17-19, 2022 (OSU) Aug 16-18, 2022 (CU)	3 consecutive days 2.1 CEUs	\$1,895
Reliability Engineering Excellence	Reliability Engineers, Maintenance Managers, Reliability Technicians, Plant Managers and Reliability Personnel	Build and sustain a strategic Reliability Engineering program and gain support to achieve your organization's reliability goals. Build the business case for reliability, design reliability into a process before it's built, identify operating risks and solve problems in all areas of asset management.	Feb 22-24, 2022 (OSU) Mar 22-24, 2022 (Virtual) Jun 14-16, 2022 (Virtual) Aug 16-18, 2022 (WSU)	3 consecutive days 2.1 CEUs	\$1,895
Reliability Excellence for Managers	General Managers, Plant Managers, Design Managers, Operations Managers and Maintenance Managers	Build a business case for Reliability Excellence, learn how leadership and culture impact a change initiative and build a plan to strengthen and stabilize the change for reliability. CMRP exam following Session Three.	New Series Start Dates: Feb 22-24, 2022 (Virtual) Jun 14-16, 2022 (CHS) Oct 18-20, 2022 (Virtual)	9 days total (3, 3-day sessions) 6.3 CEUs	\$7,495
Risk-Based Asset Management	Project Engineers, Reliability Engineers, Maintenance Managers, Operations Managers, and Engineering Technicians	Learn to create a strategy for implementing a successful asset management program. Discover how to reduce risk and achieve the greatest asset utilization at the lowest total cost of ownership.	Nov 16-18, 2021 (CU) Feb 8-10, 2022 (CHS) Mar 22-24, 2022 (OSU) Apr 19-21, 2022 (Virtual) Jul 26-28, 2022 (KU)	3 consecutive days 2.1 CEUs	\$1,895
Root Cause Analysis	Anyone responsible for problem solving and process improvement	Establish a culture of continuous improvement and create a proactive environment. Manage and be able to effectively use eight RCA tools to eliminate latent roots and stop recurring failures.	Oct 26-28, 2021 (CU) Nov 30-Dec 2, 2021 (Virtual) Jan 4-6, 2022 (WSU) Feb 8-10, 2022 (OSU) Mar 15-17, 2022 (CU) May 10-12, 2022 (Virtual) Aug 2-4, 2022 (CHS)	3 consecutive days 2.1 CEUs	\$1,895
SMRP Body of Knowledge Guided Study	Experienced maintenance and reliability professionals who want to attain the CMRP designation.	Review SMRP's Five Pillars of Knowledge. The guided study is an intensive review of each pillar's components designed for organizations looking to further develop their team through CMRP certification.	May 3-5, 2022 (CHS)	3 consecutive days Optional Exam	\$1,895

LOCATION CODES: (CHS) = Charleston, SC | (CU) = Clemson University in Greenville, SC | (KU) = University of Kansas | (OSU) = Ohio State University | (WSU) = Washington State University



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