Reliability Excellence® is a framework for reliability that begins with the foundation of principles and culture, establishes and optimizes the processes and procedures, and ultimately promotes sustainability to create a culture of continuous improvement.

<table>
<thead>
<tr>
<th>CLIENT</th>
<th>RESULTS</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharma Products</td>
<td>Increased capacity 15% Reduced COGS 5%</td>
<td>ROI &gt; 20:1 (18 months)</td>
</tr>
<tr>
<td>Healthcare Products</td>
<td>Increased availability &gt;15% Improved OEE 10% Reduced maintenance costs 20%</td>
<td>ROI: &gt;15:1 (3 years)</td>
</tr>
<tr>
<td>Steel</td>
<td>Increased capacity through OEE improvements of greater than 2%</td>
<td>ROI &gt; 11:1 (3 years)</td>
</tr>
<tr>
<td>Metals Processing</td>
<td>Reduced maintenance spending 20% Increased anode capacity 10% Increased aluminum capacity 4%</td>
<td>ROI 16:1 (3 years)</td>
</tr>
<tr>
<td>Beverage</td>
<td>Increased capacity of high speed process &gt; 25% / Reduced COGS 10%</td>
<td>ROI &gt; 20:1 (24 months to date)</td>
</tr>
</tbody>
</table>

Organizations implementing Reliability Excellence have seen a significant return on investment and other benefits such as:

- Increased capacity
- Increased product availability
- Reduced cost of goods sold
- Improved OEE
- Reduced maintenance costs and spending

The table to the left shows results seen by our clients in certain industries.

---

Save The Date!
February 23-24, 2017

The Reliability Excellence® Conference
Charleston, SC

Network with other users, alumni and advocates of the Reliability Excellence Model. Share best practices and collaborate on continuous improvement. This two-day event will include workshops determined and delivered by the Reliability Excellence community.

Email info@LCE.com for more information.
Contents

Services
Asset Performance Improvement
  LCE’s Approach to Asset Performance Improvement ........................................ 4
  Reliability Excellence for Existing Plants and Facilities ................................ 5
  Life Cycle Planning for Start-ups ............................................................... 6
Asset Productivity
  Capital Delivery ......................................................................................... 7
  EAM/CMMS .............................................................................................. 7
  MRO Supply Chain Management ............................................................... 8
  Operator-driven Reliability ....................................................................... 8
  Shutdown, Turnaround and Outage Management ...................................... 9
  Work Management ...................................................................................... 9
Process Performance
  Line Performance Optimization ............................................................... 10
Reliability Engineering
  Asset Criticality Development ................................................................. 11
  Equipment Maintenance Plans and Job Plans .......................................... 11
  Factory and Site Acceptance Testing ......................................................... 11
  Functional Specification Development ...................................................... 12
  Hierarchy Development ........................................................................... 12
  Loss Elimination ....................................................................................... 13
  Machine Design FMEA ............................................................................. 13
  Preventive Maintenance Optimization ....................................................... 13
  RAM Analysis ........................................................................................... 14
  Reliability Audit and Assessment ............................................................. 14
  Reliability Centered Maintenance Study ................................................... 14
  Root Cause Failure Analysis ................................................................... 15
Learning, Leadership and Change
  Change Management ................................................................................. 16
  Learning Design and Development ........................................................... 17
  Project Management .................................................................................. 18
Training
  Facilitators Make the Difference ............................................................. 19
  3A Learning ............................................................................................... 20
Public Courses
  Maintenance Management Skills .............................................................. 22
  Maintenance Planning and Scheduling ...................................................... 23
  Maintenance Planning and Scheduling eLearning .................................... 24
  Materials Management ............................................................................. 25
  Planning for Shutdowns, Turnarounds and Outages ................................ 26
  Predictive Maintenance Strategy ............................................................... 27
  Reliability Engineering Excellence .......................................................... 28
  Reliability Excellence for Managers ........................................................ 29
  Risk Based Asset Management ............................................................... 31
  Root Cause Analysis ................................................................................. 32
  SMRP Body of Knowledge ....................................................................... 33
Certification
  Change Management Training ................................................................. 34
  Maintenance Management Certification (MMC) ....................................... 35
  Reliability Engineering Certification (REC) .............................................. 36
Private Courses ............................................................................................ 37
About Us ....................................................................................................... 38
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

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

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.
Life Cycle Planning For Start-Ups

We combine our 40+ years of experience fixing plants that did not have a total asset management strategy with our team's experience in hundreds of startups to develop a strategy specifically for new plants and facilities. These strategies are designed to ensure that clients realize the value from their startup and achieve the lowest life cycle cost. The following figure illustrates Total Asset Performance for new plants.

### Integrated Life Cycle Planning for Start-up

1. **Life Cycle Asset Management Implementation Framework**
2. **Culture, Strategy, Design & Planning**
3. **Asset Life Cycle Design Activities**
4. **Operational Preparedness:**
   1) Operations & Quality
   2) Maintenance & Reliability
   3) Systems and Infrastructure
   4) HSE and Standards
5. **Supply Chain Development**

---

**Hundreds of FREE resources for your reliability journey**

Visit PoweredByRx.com
Services - Asset Productivity

Capital Delivery

Scope of Services:
Assessments, coaching in process development, and over-the-shoulder coaching in these areas:

• Strategic Capital Planning
• Project Request
• Feasibility Study
• Conceptual Design
• Functional Specifications
• Detailed Design
• Project Approval
• Project Execution
• Engineering Change Management
• Quality Audits
• Operating Plans
• Commissioning
• Decommissioning
• Disposal

Deliverables:
• Strategic Capital Plan
• Capital Project Management Processes

EAM /CMMS

Scope of Services:
Assessments, coaching in process development, and over-the-shoulder coaching in these areas:

• Configure to Match Work Processes
• Configure Multiple User Profiles
• Configure Chart of Accounts
• Configure Approval Hierarchy
• Formal User Guide / Training Materials
• Integrate EAM/CMMS with Business Management Software
• MOC Process for Configuration Changes
• KPIs and Reports
• Scheduled Data Audits

Deliverables:
• EAM/CMMS processes for administering the system
• An optimized functional system
MRO Supply Chain Management

**Scope of Services:**
Assessments, coaching in process development, and over-the-shoulder coaching in these areas:

- Inventory Stock/Non-stock Process
- Emergency Purchasing Process
- Receiving Process
- Incoming Inspection Process
- Inventory Requisition Process
- Inventory Issue Process
- Cycle Counting Process
- Return to Supplier Process
- Planned Work Kitting and Delivery to Point of Use Process
- Obsolete Inventory Identification Process
- Repairable Component Process
- MRO Purchase Process
- Equipment BOM Review Process
- Inventory Stocking Process
- Min/Max Level Review Process
- Return to Inventory Process
- Parts Master Data Management Process
- Disposition of Parts not in Inventory
- Supplier Management Process

**Deliverables:**

- MRO Supply Chain Assessment
- Materials Management Fundamentals Overview Session
- Coaching of MRO Supply Chain / materials management personnel to include supply chain / purchasing, storeroom, material handlers, and related management

Operator-driven Reliability

**Scope of Services:**
Assessments, coaching in process development, and over-the-shoulder coaching in these areas:

- Operator Care (TPM) Round Development
- Operator Care Round Execution
- Visual Management / 5S / Results Tracking
- Product Loss Elimination
- Operator Training Plan
- Product Changeover/SMED
- Standard Work
- Leader Standard Work

**Deliverables:**

- Operator-driven reliability processes.
- Templates for Operator Care Rounds and Standard Operations Procedures (SOPs)
- Operator training matrix
- Visual management tools
- Robust production loss tracking process that will guide the organization to areas of overall improvement
Services – Asset Productivity

Shutdown, Turnaround and Outage Management

An Institute subject matter expert (SME) will help your organization implement new processes and behaviors. We will apply our proprietary 3A Learning® process to create sustained behavior change by establishing clear alignment on expectations, delivering active classroom learning experiences, and providing hands-on coaching.

**Week 1:** In our first week on site we will assess the organization’s current shutdown processes and procedures. The STO SME will guide development of processes and procedures that reflect best practices. Following the assessment we will deliver the two-day Leadership for Shutdowns, Turnarounds and Outages workshop.

**Week 2:** The Life Cycle Institute will deliver the three-day Planning for Shutdowns, Turnarounds and Outages workshop. Individual coaching on STO planning will also occur this week.

**Week 3:** We will coach your team on applying the tools and techniques learned in the first two weeks. We will guide you on embedding these best practices into the organization’s culture so they will be in place for future shutdowns.

**Deliverables:**
- Assessment of shutdown procedures
- Two-day Shutdown Leadership training workshop
- Three-day Planning for Shutdowns, Turnarounds and Outages training workshop
- Reassessment of how practices have been applied based on goals established during training

Work Management

Planning and Scheduling Best Practices Assessment and Coaching

**Scope of Services:**
Assessments, coaching in process development, and over-the-shoulder coaching in these areas:

- Work Identification
- Work Approval/Prioritization
- Work Planning
- Work Scheduling
- Planned Work Execution
- Unplanned Work Execution
- Work Order Closeout

**Deliverables:**
- Planning and Scheduling Assessment
- Planning and Scheduling Fundamentals Overview Session
- Coaching of planning and scheduling personnel
LCE’s Line Performance Optimization (LPO) model fully integrates key Reliability Excellence concepts with selected lean tools supported by a well-defined change management process that ensures sustainability. The LPO model is designed as a comprehensive approach for solving chronic and persistent reliability issues with a specific manufacturing line. Common reliability issues include production losses due to unplanned downtime, ineffective maintenance practices, lack of standardized processes, quality-related issues, and loss time due to material flow design.

Clients using this targeted approach have increased OEE by an average of five percentage points (for example, from 70% to 75%). Depending on your specific cost / volume / profit equation the improvement to the bottom line will quickly result in a positive ROI.

Implementation of the LPO model typically lasts from six to 12 weeks and can include the following elements:

• We guide you through a value stream mapping exercise that focuses the problem solving while identifying key loss elimination opportunities.
• To diagnose inherent failure modes we perform FMEAs on critical pieces of equipment identified through the value stream mapping exercise. We work with your team to develop strategies to eliminate root cause and create Equipment Maintenance Plans to ensure sustainability.
• We work with your team to create best-practice processes for start-up, shut down and change over. Those processes are then standardized to eliminate variability.
• We add Lean / visual factory elements to the solution. Visual management boards are implemented on the plant floor. Production results are tracked and compared to goals. Critical downtime causes are summarized using Pareto analysis. The work force is engaged in the problem-solving process for identifying corrective actions for addressing root cause.
• We integrate change management throughout the process to fully engage the workforce and gain their active sponsorship and support for the changes in work processes, procedures and practices that are always a part of the solution. This change management component is essential to long-term, sustainable results.

Asset Reliability @Work

PODCAST SERIES

Sharing insights and best practices for improving asset performance and reliability

Subscribe Now!
Search "Asset Reliability@Work"

www.LCE.com/Podcasts
Asset Criticality Development

Scope of Services:
- Definition of criteria for assessing asset criticality
- Collection of background information and data
- Training of team involved in performing the assessment
- Criticality assessment and listing

Deliverables:
- Detailed, prioritized list of all assets in scope with assigned criticality

Equipment Maintenance Plans and Job Plans

Scope of Services:
- Assess and / or develop equipment hierarchy
- Review and collect equipment nameplate and configuration information (where needed)
- Develop equipment maintenance plans (EMPs) for maintainable assets
- Develop maintenance/job plans, in agreed-upon format from finalized EMP
- Recommend any Predictive Maintenance (PdM) job plans where applicable
- Review with client and finalize maintenance /job plans
- Submit finalized maintenance job plans

Deliverables:
- Equipment maintenance plans (EMPs) for the selected equipment within the project
- Job plans for the PM/PdM tasks included in the EMP
- Uploadable files in MS Excel or MS Word format for migration to your EAM system

Factory and Site Acceptance Testing

Scope of Services:
- Review specifications and expectations for the assets
- Develop test plans and supervise a factory and site acceptance test
- Provide a report that confirms compliance, identifies any deviations and recommends any necessary corrective actions

Deliverables:
LCE will generate a formal report that confirms compliance with engineering best practices and the functional specifications of the capital asset(s) and/or will define each of the deviations from these practices or specifications. The report will:
- Verify compliance with functional specifications, vendor’s specifications and best engineering and manufacturing practices
- Identify all deviations from functional specifications and best practices
- Provide an estimate of potential impact of deviations
- Recommend corrective or remedial actions
Functional Specification Development

**Scope of Services:**
- Outline scope and expectations for functional specification
- Gather appropriate requirements and meet with subject matter experts
- Produce formal functional specification

**Deliverables:**
- A comprehensive functional specification that clearly defines the functional, performance, reliability, maintainability and useful life of a proposed new, rebuild or overhaul capital asset. The formal specification will include:
  - Concise description of the asset
  - Specific reliability, maintainability and availability expectations, including specify key performance indicators (KPIs) that will be used to verify and validate compliance
  - Factory and site acceptance testing criteria and methodology that must be met before acceptance of the new or upgraded asset
  - Asset Management Plan: The functional specification will include a requirement for documentation that concisely defines a risk management plan, an operations plan and a maintenance plan

Hierarchy Development

**Scope of Services:**
- Evaluation of the existing or development of a new hierarchy as per ISO 14224 and BSI PAS-55 standard
- Evaluation of the overall operational hierarchy structure for the organization
- Assessment of the need for both an asset and location hierarchy to address distributive systems, rotatable pool, and linear assets
- Development and definition of asset classification and required attributes down to the lowest maintainable asset
- Asset cataloging of databases for migration to EAM

**Deliverables:**
- An asset/equipment or functional location hierarchy that meets industry best practices standards
- A developed hierarchy in electronic format for uploading into an EAM system
Loss Elimination

Scope of Services:
- Meet with plant personnel to review known waste and loss issues
- Review existing data and compare to best-in-class plants to identify opportunities
- Perform Root Cause Analysis (RCA) on top three opportunities
- Provide a report that defines the opportunity and recommends specific actions to eliminate losses

Deliverables:
- A formal report that defines the top three losses discovered through the evaluation process. The report will:
  - Briefly describe each of the problems or issues
  - Define the root cause or causes of each of the problems
  - Estimate the potential impact of deviations
  - Recommend corrective or remedial actions
- A complete listing of losses and waste identified by this scope of work

Machine Design FMEA

Scope of Services:
LCE reliability engineering experts will:
- Collect machine design data
- Collect information on planned operations plan
- Develop a functional block diagram
- Identify potential functional failures
- Identify potential failure modes
- Map failure modes to equipment
- Analyze potential failures
- Generate a RPN
- Develop mitigation strategies

Deliverables:
- Machine Design FMEA workbook

Preventive Maintenance Optimization

Scope of Services:
- Define equipment to be included in the PM/PdM program optimization
- Review current program, documentation and procedures
- Review equipment work order history
- Create report that describes findings and deficient areas and includes an action plan for improvement

Deliverables:
- Detailed report describing all PM/PdM review findings and deficient areas
- Action plan for improvement
Services – Reliability Engineering

RAM Analysis

Scope of Services:
LCE reliability engineering experts will:
- Develop functional block diagrams
- Gather reliability data, from the equipment manufacturer and/or experience with similar equipment in similar service, defined as the ability of a system and its components to perform a required function under stated conditions for a stated period
- Gather operating plan information, defined as the anticipated machine or cell production requirements
- Review the maintainability of the assets, including design-dependent parameters pertaining to ease, accuracy, safety and economy in the performance of maintenance functions
- Complete the RAM analysis
- Develop design strategies to reduce unacceptable risks

Deliverables:
- RAM analysis report

Reliability Audit and Assessment

Scope of Services:
- On-site plant tour, observations, data gathering and interviews with plant personnel
- Written and oral feedback
- An improvement plan that addresses gaps identified during the audit and assessment

Deliverables:
- Assessment report that identifies specific gaps between the current reliability program and best practices
- SWOT analysis
- Summary of recommendations
- Prioritized action plan

Reliability-Centered Maintenance Study

Scope of Services:
- Identify the optimal tasks and appropriate frequency for your critical assets
- Collect data and perform equipment walk down and field inspection
- Perform and document RCM study

Deliverables:
- Final RCM report workbook that includes:
  - Functional block diagram of system
  - FMEA
  - Task lists
  - RCM decision diagram used
  - Scales for risk ranking
  - Identified items for further action
  - Record of the steps leading to final determination
Services – Reliability Engineering

Root Cause Failure Analysis

 Scope of Services:
• Define the problem or problems
• Perform a full Root Cause Failure Analysis (RCFA)
• Develop recommended solutions
• Document the RCA effort and provide recommendation for cost-effective, permanent solution

 Deliverables:
• Definition of problem with business case for improvement
• Identification of root cause(s)
• Report documenting RCFA effort and recommendations for cost-effective, permanent solution
• Assistance in measuring and communicating your success to show the return on investment of resolving the problem

Considering a holistic transformation, tactical implementation or continuous improvement project?

Schedule your Reliability Excellence Assessment today!
800-556-9589 or info@LCE.com
We specialize in change management support, staff augmentation and building change management as an organizational competency. Research proves that effective change management has a direct impact on three dimensions of project success. Projects that employ effective change management are:

- 6X more likely to meet objectives
- 4X more likely to meet schedule
- 3X more likely to meet budget

Prosci® 2016 Best Practices in Change Management benchmarking report

**We provide resources and expertise to enhance your team’s capabilities in:**

- Business process design/redesign
- Software implementations and technology upgrades
- Organization restructuring
- Merger or acquisition
- Expansion or downsizing
- Business model change or new venture
- New marketing campaign
- Job redesign
- Workforce transition

**Life Cycle Institute Change Management Services**

- Change management strategy
- Change readiness and project risk assessments
- Sponsor and manager coaching
- Integrating change management and project management
- Stakeholder management
- Development of change management plans

**Life Cycle Institute’s team of professionals includes:**

- Managing principals
- Change management subject matter experts
- Prosci-certified change management facilitators
- Communications subject matter experts
- Learning subject matter experts who hold a Masters of Education and Certified Professional in Learning and Performance (CPLP®)
- Project Management Professionals (PMP)®

Life Cycle Institute offers a multi-dimensional approach

We implement the Prosci methodology

We integrate change management and learning

We develop customized solutions

Our team consists of thought leaders and industry experts
Learning Design and Development

The development of meaningful objectives, relevant content and a practical understanding of how people learn are critical to a successful learning experience. Life Cycle Institute learning subject matter experts apply proven learning principles and expertise to deliver learning solutions that change behavior to produce results.

Our learning subject matter experts provide:

New Course Development
- Live classroom
- Live online
- Computer-based training (CBT)
- Interactive courseware (ICW)

Course Conversion
- Convert existing courses into active, results-producing learning engagements
- Transform classroom-based courses to synchronous or asynchronous online training

Blended Learning
- Create blended products that include classroom and online training for maximum exposure or just-in-time support

Facilitator Development

Learning Needs Analysis and Competency Assessment

Knowledge Capture

We implement our proprietary 3A Learning® process in all learning engagements. This three-phase learning process encompasses the steps required before, during and after learning to achieve results. More information on this approach can be found in the 3A Learning section on page 20.

Why work with Life Cycle Institute’s learning team?
- Our team consists of learning professionals credentialed with Masters of Education, Certified Professional in Learning and Performance (CPLP®), Project Management Professional (PMP)® and certified change management professionals
- We incorporate the elements of our 3A Learning process on all engagements
- SME Partnerships: We have extensive experience working with busy subject matter experts, coaching them to embrace innovative and provocative ways to engage learners
- Focus on objectives: Learning is a process founded on learning objectives that create a clear line of sight on how a learner’s behavior contributes to organizational goals
- Results: Whether you need an online course, classroom-based instruction or a blended learning solution, we will deliver a dynamic solution to meet your business objectives
- Learning leaders: We leverage a proven course development process that comprises the latest science in adult learning and advanced learning strategies to create participant-centered, active learning products
We provide project support to organizations so they can remain focused on strategic vision and leave the tactical execution to us. Our team of experienced project managers and facilitators will work with you to complete project tasks, plan and manage communications, and facilitate meetings.

Our project management professionals provide:

**Project Management**
- Stakeholder management
- Risk management
- Requirements collection
- Develop work breakdown structure
- Plan and schedule project activities
- Project reporting

**Communication Management**
- Communication planning
- Developing communication artifacts

**Group Facilitation**
- Facilitation planning
- Strategy meetings
- Problem-solving sessions
- Planning meetings
- Focus team meetings
- Requirements gathering

**Why work with Life Cycle Institute’s project management team?**
- We boast more than 25 years of experience helping clients implement projects
- Our approach to project management is deeply rooted in change management principles, resulting in increased project success
- Project Management Professionals (PMP)® on staff who are experienced in virtual project management
- Communication specialists who can plan and develop effective project communications

Tara D. Holwegner, CMRP, CPLP, PMP
Tara designs performance solutions that drive accountability and deliver results.

Sherri Large, MMC, PMP
Sherri is a project manager who helps organizations transform ideas into actionable plans.
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.

What our students are saying about our facilitators:

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

Tony Geary, Alcoa

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

Allen Jones, Boeing

“...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

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
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.

Active Learning

What I hear, I forget.
What I see, I remember.
What I do, I understand.
Life Cycle Institute’s 3A Learning® Process

Successful learning events recognize that adults learn differently. They bring a wide range of knowledge, life experiences, interests and competencies to the experience. The following four principles of adult learning should be incorporated into any active learning environment:

1. Prior Knowledge
2. Relevance
3. Active
4. Self-Direction

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.
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 has been another excellent educational experience.”
Steven St Clair, Puget Sound Energy

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.

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.

This course is one of six courses that can be applied to the Maintenance Management Certification program described on page 35.
Planning and scheduling is one of the fastest and most effective investments an organization can make to improve productivity and availability. The processes participants learn in this class will allow for planning and control of maintenance resources. Equipment reliability is increased. Costs and availability of maintenance stores are improved. Waiting times, unnecessary parts and inaccurate information are eliminated. Budget-ing is easier and more accurate. Maintenance tasks are as much as 50% more efficient in terms of costs and time.

This five-day course teaches proven processes that are fundamental to effective planning and scheduling and successful CMMS/EAMS deployment. Participants engage in hands-on activities that build systems-independent process knowledge and skills they will be able to apply immediately.

**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**

**Define the planner/scheduler environment**

- Understand common maintenance problems, delays and inefficiencies
- Define the nature of repair (reactive) vs. maintaining (proactive)
- Sustain the commitment and support of management

**Develop an effective planning program**

- Apply a maintenance assessment process and a proactive maintenance timeline
- Coordinate the roles and responsibilities of maintenance supervisors and planners
- Differentiate between reactive, preventive and predictive maintenance
- Explain work measurement to the maintenance work team
- Use performance metrics, PM compliance, schedule compliance, backlog, efficiency, and labor utilization
- Define the essentials of critical path planning

**Manage scheduling and coordination**

- Define the term backlog and its relationship to estimating
- Balance manpower demand

**Create effective job plans**

- Prepare a detailed job plan
- Plan individual job activities

**What our Students are Saying:**

"This class was a great experience…it was extremely informative and the instructor was outstanding and very knowledgeable of the planning function based on real world experiences! It was definitely worthy of my time and effort."  

Larry Jeffcoat, Michelin

"The instructor’s no-nonsense delivery was a breath of fresh air in a topic that is usually riddled with acronyms & buzzwords. This real world approach is exactly what is needed in order to master these concepts."

Brian Buzard, Central Arizona Project

This course is one of six courses that can be applied to the Maintenance Management Certification program described on page 35.
Maintenance Planning and Scheduling eLearning

Coming early 2017!

Maintenance Planning and Scheduling eLearning transforms our most successful learning program and decades of best-practice benchmarking into a performance-driven, self-paced online solution that offers organizations the ability to:

- Reach geographically dispersed teams
- Offer just-in-time and rapid onboarding training
- Achieve a consistent, enterprise-wide work management vocabulary and knowledge baseline

With built-in practical application and downloadable tools, you will be able to immediately apply what you learn in the modules.

- Challenging learners: learners are faced with real-world scenarios and problems in the module, requiring them to think critically, solve problems and practice new behaviors.
- Engaging learners: the modules employ high-fidelity eLearning and instructional design best practices as well as incorporating media, simulations, problem solving and branching scenarios that engage learners.
- Driving performance: the modules support on-the-job application by prompting action plans and suggesting follow-up tasks and tools they can download from the module.

Maintenance Planning and Scheduling eLearning was designed by certified learning professionals who are also maintenance and reliability professionals (CMRP, CRL), and developed by a team of eLearning specialists using cutting-edge eLearning best practices and approaches.
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

What our Students are Saying:

“What is great about this course is that the content is state-of-the-art and packaged neatly. It would take years to learn this by experience and it is not otherwise documented.”
Wayne Groover, Chaparral Steel

“This was a great course which will help me better develop my work processes in the stockroom.”
Bill Csuk, Wrigley Manufacturing

This course is one of six courses that can be applied to the Maintenance Management Certification program described on page 35.
Planning for Shutdowns, Turnarounds and Outages

After attending this three-day course, you will save time and money on your next shutdown. Our promise for this program is that you will have a new and deeper understanding of how to effectively manage large maintenance jobs such as power plant outages and refinery refits. This course is 85% concerned with the time before the shutdown begins. The remaining 15% is the execution tactics to keep the project on course. This course includes specific checklists, procedures, strategies and important outside resources that will improve your current shutdown planning and execution. The course also includes examples to demonstrate the major points.

NOTE: While some industries use the phrases outage, shutdown and turnaround interchangeably, other industries ascribe very specific and different meanings to the terms. From the perspective of planning, however, in this course we have decided to use the terms interchangeably.

Learn How To

• Develop a checklist of everything to consider before the shutdown and when to consider it
• Evaluate the effectiveness of your current shutdown effort
• Measure your shutdown efficiency by benchmarking with world-class shutdown strategies
• Formulate good contractor relations to further reliability
• Unearth tools and technologies that can smooth the process and create a backbone for effective plant maintenance and reliability

Who Should Attend

Successful shutdowns, turnarounds and outages 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 them. People in the following roles should participate in this training:

• Maintenance Planner/Schedulers
• Production Supervisors
• Storeroom Managers
• Maintenance Managers and Supervisors
• Operation Coordinators
• Plant Engineers
• Outage Coordinators
• Reliability Engineers
• Facilities Managers
• Project Managers
• Asset Management Specialists
• Quality Assurance
• Procurement

What our Students are Saying:

“...I was truly enlightened on the matters of real maintenance and all associated practices that make up the system.”

Patrick Banister, Nektar Therapeutics

“This event has acquired knowledge and goal setting for my company in the future.”

Petronas Gas Berhad, Malaysia
Predictive Maintenance Strategy

Who Should Attend
Maintenance managers, PdM managers, maintenance professionals, continuing education students, and any person responsible for justifying or managing duties related to a PdM program.

Learn How To
Explain how a combination of predictive maintenance, condition monitoring and non-destructive testing mitigates risk and optimizes your asset maintenance plan.

- Vibration analysis
- Thermography
- Tribology (oil analysis)
- Ultrasonics
- Motor circuit analysis

Recognize visual inspection as a component of a PdM program.

Draft a predictive maintenance strategy that incorporates critical success factors in the following areas:

- Data and measurement requirements
- Planning and set-up
- Monitoring the program
- Showing results

Compare your current PdM program to best practices and build a plan to meet your PdM goals.

What our Students are Saying:

"Excellent material! I was impressed with how the course stressed the importance of planning and scheduling. Additionally, my eyes were opened to the importance of specific and repeatable documented maintenance tasks."

Joe O’Brien, Goodrich

"The facilitator is an authority in the course subject matter. He was dynamic, enthusiastic and humorous. The content was delivered in a logical manner and the facilitator made sure everyone understood."

Brian Berg, Goodrich

Predictive maintenance is not a tool, technique or certification. Predictive 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 technologies like vibration monitoring or oil analysis, this course focuses on establishing, managing and sustaining results from a comprehensive PdM program.

The Predictive Maintenance Strategy course considers predictive maintenance as a component of a larger asset management strategy to diagnose, prevent and postpone failures. During this three-day course, you will learn the theory and application of multiple PdM technologies. You will review critical success factors of results-producing PdM programs. Through group activities and case studies, you will determine which predictive 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 PdM program can look like at your organization.

This course is one of the four courses that lead to the Reliability Engineering Certification program described on page 36.

This course is one of six courses that can be applied to the Maintenance Management Certification program described on page 35.
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.

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.

What our Students are Saying:

“Define how reliability impacts business performance”
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.”
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.”
One of the best trainings I have completed in my professional development.
Sam Walker, Nektar Therapeutics

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
Reliability Excellence for Managers
In Spanish in Mexico in 2017!

Join the fast-growing group of maintenance and reliability leaders who have improved their organizations’ performance and advanced their careers by applying Life Cycle Engineering’s Reliability Excellence® framework.

### CLIENT | RESULTS | ROI
---|---|---
Pharma Products | Increased capacity 15% Reduced COGS 5% | ROI > 20:1 (18 months)
Healthcare Products | Increased availability >15% Improved OEE 10% Reduced maintenance costs 20% | ROI >15:1 (3 years)
Primary Metals (34 Plants) | Reduced maintenance spending 10% Increased capacity (% confidential) | ROI 5:1 to 16:1 (3 years)
Metals Processing | Reduced maintenance spending 20% Increased anode capacity 10% Increased aluminum capacity 4% | ROI 16:1 (3 years)
Steel | Increased capacity through OEE improvements of greater than 2% | ROI > 11:1 (3 years)
Beverage | Increased capacity of high speed process > 25% / Reduced COGS 10% | ROI > 20:1 (24 months to date)

The Reliability Excellence model is a flexible, scalable framework that has been adopted by dozens of Fortune 500 organizations as their framework for reliability and asset management.

Reliability Excellence for Managers (RxM) is the original reliability program designed to build competency through multiple classroom learning sessions and practical application over a year. Each year the content is updated to include our findings from new research, assessments, and application. In the past decade over 600 people, from nearly 200 organizations, have enrolled in the program.

You will learn how to customize and apply the tools and processes required to develop, implement and sustain world-class, reliability-based performance and a Program facilitators are certified reliability professionals with decades of experience implementing reliability. The program is designed and maintained by a team of respected thought leaders and authors in maintenance and reliability, including Keith Mobley, Joel Levitt, and Tim Kister.

The best training class I’ve ever attended since being in this industry.

Pulp Mill Manager

The course materials were excellent and the facilitator was well prepared. He used outstanding instructional techniques and is truly a subject matter expert.

Maintenance /Reliability Planner
RxM is delivered in four, three-day sessions with a six to eight week interval between sessions. After each session, you are encouraged to apply what you have learned to reinforce learning and raise retention. When you return for the following session, you will share your experiences, thereby gaining a deep understanding and ability to sustain your new learning.

Over the four-part program, you will build a business case for Reliability Excellence. You will learn how leadership and culture impact a change initiative, and how to become a change agent to help keep your organization reliable, agile and competitive. You will become aware of the business processes associated with world-class performance. Finally, you will build a plan to strengthen and stabilize the charge for reliability.

Secure your Certified Maintenance and Reliability Professional (CMRP) credential by taking the exam proctored at the conclusion of the last session. While RxM is not a CMRP prep course, many of the more than 150 participants who have taken an LCE-proctored CMRP exam cite this program as contributing to their success.

**Learn How To**

**Session 1 - Building the Foundation for Rx**  
(Topics related to SMRP BoK Pillar 1 – Business and Management)
- State the driving factors behind an Rx-based transformational change
- Build a business case for Rx
- Outline the overall philosophies of Reliability Excellence
- Develop Rx functional roles, responsibilities and partnerships within the organization
- Recognize the need for active leadership
- Define governing principles
- Describe how to build an enabling infrastructure, including organizational structure, budget and cost management
- Recognize the correlation between OHS and reliability
- Explain how Rx enables LEAN, Six Sigma, TPM
- Create an Rx A3

And more ...

**Session 2 – Leading and Managing Change**  
(Topics related to SMRP BoK Pillar 4 – Organization and Leadership)
- Differentiate between being effective and efficient
- Differentiate between technical and transformational change
- Assess systems, structures and leadership style
- List five critical success factors for implementing change
- Describe four change roles and their primary activities
- Summarize physiological and psychological effects of change
- Develop an Rx risk management plan
- Develop a Gemba walk job aid

And more ...

**Session 3: Best Practice Business Processes and Optimization**  
(Topics related to SMRP BoK Pillar 2 – Manufacturing Process Reliability and Pillar 3 – Equipment Reliability)
- Discuss the role of standardized processes and procedures.
- Summarize the critical role of work management in success and sustainability
- Discuss methods to lower total cost of ownership and extend useful life of capital assets
- Examine how to eliminate waste and non-value-added activities by implementing a loss elimination process
- Define key requirements of effective materials management
- Discuss how the reliability engineering function manages risks and optimizes performance
- Outline an effective Life Cycle Asset Management program

And more ...

**Session 4 – Sustaining Reliability and Continuous Improvement**  
(Topics related to SMRP BoK Pillar 1 – Business and Management and Pillar 5 – Work Management)
- Develop Rx key performance indicators (KPIs)
- Discuss how a company dashboard and balanced scorecard report Rx progress to leadership
- Use a role and responsibility matrix to increase engagement
- Discuss 4 components of audits and assessments
- Discuss how equipment history and asset process design sustain reliability
- Use tools to support work management
- Draft a master plan to a successful Rx transformation
- Complete a business case for Rx

And more ...
Risk-Based Asset Management

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: risk and maintenance 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 six courses that can be applied to the Maintenance Management Certification program described on page 35.

This course is one of the four courses that lead to the Reliability Engineering Certification program described on page 36.

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
CMRP candidates will be guided through each pillar of knowledge in the SMRP Body of Knowledge by an experienced CMRP and proctor. The guided study is an intensive review of each pillar’s components using interactive discussion, sharing of real-world examples and sample questions that are designed to familiarize applicants with CMRP exam content.

The Maintenance and Reliability Best Practices, 2nd edition book by Ramesh Gulati will be provided as part of the course material.

The candidate is responsible for registering for the CMRP exam and associated fees through SMRP.

Participants who read the following resources prior to review have greater success passing the CMRP exam:

- CMRP preparation guide (available on the SMRP website)
- The Asset Management Landscape, 2nd edition (Global Forum on Maintenance and Asset Management – gfmam.org)
- Maintenance and Reliability Best Practices, 2nd edition (Ramesh Gulati)

**Learn How To:**

**Define key elements of a reliability-focused business and management strategy (Pillar 1):**

- Create and manage a strategic direction and plan for reliability
- Select, track and report on key performance indicators
- Change management and communication
- Managing environmental, health and safety risks

**Define how reliability activities improve manufacturing process reliability (Pillar 2):**

- Understand process flow, parameters and quality specs
- Process improvement techniques – e.g. loss elimination and continuous improvement programs
- Maintaining processes in accordance with standards and regulations

**Outline equipment reliability best practices (Pillar 3):**

- Determining equipment reliability expectations and goals
- Evaluate equipment reliability and identify improvement opportunities
- Establish a plan to ensure equipment reliability for new and existing assets
- Cost justify plans for implementation
- Implement reliability plans and periodically review performance

**Describe how organization and leadership support maintenance and reliability staffing and development (Pillar 4):**

- Determining organizational competency and staffing requirements
- Analyzing organizational capability and developing personnel
- Organizational structure, roles and responsibilities for reliability
- Leading and managing people

**Cite work management best practices (Pillar 5):**

- How to identify, validate and approve maintenance and reliability work
- Maintenance and reliability work priority, planning and scheduling
- Executing and documenting work
- Analyzing and measuring work performance
- Planning and executing maintenance and reliability projects
- Using information technologies effectively
- Managing resources and materials effectively

**Course Information**

The course is 3 days of instruction and individual study, with the CMRP exam proctored on the morning of day 4. The CMRP will be awarded by SMRP upon successful completion of the CMRP exam.

**CMRP Exam**

The CMRP exam is proctored on the morning of day 4. All candidates must register for the exam through SMRP. The exam fee is paid directly to SMRP and is not included in the course fee.

**Who Should Attend**

Experienced maintenance and reliability professionals who want to attain the CMRP designation. Professionals interested in building their competency in maintenance and reliability disciplines: business and management, leadership, equipment reliability, manufacturing process reliability and work management.
Change Management Training

Prosci® Change Management Certification Program

Build change management competency by becoming certified in Prosci’s research-based 3-Phase Change Management Process. Be prepared to lead your organization through both incremental and radical changes.

In this three-day change management program, you will apply Prosci’s change management tools, research and methodology to an actual project at your organization. At the conclusion of the course, you will leave with your change management plan in hand.

Prosci is the world leader in change management best practices and research. Prosci’s methodology has become one of the most widely used approaches for managing the people side of change in corporations and government.

Learn How To

• Develop a Master Change Management Plan
  • Communication Plan
  • Training Plan
  • Coaching Plan
  • Resistance Management Plan
• Handle the Psychology of Change
• Apply Prosci’s 3-Phase Process for Managing Change
• Calculate Return on Investment (ROI) of Change
• Utilize Best Practices in Change Management
• Apply the ADKAR® Model to changes within your organization
• Develop a Change Management Strategy
• Create a Sponsorship Roadmap
• Reinforce Change

Who Should Attend

Prosci's Change Management Certification Program is designed for employees who are responsible for managing change on a specific project or building change management competency within their organization. This includes project managers, project team members, HR leaders, OD leaders, change management team members, sponsors of change, consultants and trainers.

Change Management Project Training

Change Management Sponsor Program

In this half-day workshop leaders will learn the critical connection between change management and business results, understand their role in effective executive sponsorship, build support and strategically position their projects for success.

Change Management Employee Orientation

This program is designed for front-line employees impacted by change in your organization. Employees will gain a feeling of control over the change process, learn the concepts of change management, understand how to use the ADKAR model as a change tool and engage in the changes underway in the organization.

Change Management Coaching Program

This one-day program is ideal for managers and supervisors who are helping their employees transition through change. They will learn to use the ADKAR model for individual change, manage employee resistance and lead employees through both radical and incremental change.

Delivering Project Results: Change Management Workshop for Project Managers

This results-oriented workshop provides project teams with awareness of how change management can help them meet a project’s intended outcomes. Participants will connect employee adoption and usage to project results, identify when their project needs change management resources, and understand how change management drives project outcomes.

Prosci® and the Prosci logo are registered trademarks of Prosci Inc.
800-556-9589 | info@LCE.com | www.LCE.com
I have the appropriate tools and skill sets to push my company’s maintenance program to become a world class organization.

Achieve your Maintenance Management Certification from one of the country’s top engineering schools.

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:
• Maintenance Planning and Scheduling
• Maintenance Management Skills

Select two of the following electives:
• 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.
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 work product. 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.

*At least two courses must be taken at the university granting the certification.

Reliability Engineering Certification Work Product
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 recipients saw significant financial benefits by completing the work product.

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.
<table>
<thead>
<tr>
<th>COURSE</th>
<th>WHO SHOULD ATTEND</th>
<th>YOU WILL LEARN HOW TO</th>
<th>DAYS/CEUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 55000: Asset Management System</td>
<td>Operations and Maintenance Managers, Reliability Engineers, Capital Project Engineers, Asset Owners, Asset Managers, Organizational Development, Quality Personnel</td>
<td>See examples of asset management strategies, learn the asset management policy components, and develop a draft policy for your organization.</td>
<td>2 consecutive days 1.4 CEUs</td>
</tr>
<tr>
<td>IAM Certificate Workshop</td>
<td>Experienced engineers and asset management professionals</td>
<td>Prepare for the IAM Certificate exam. Learn the principles and practice of asset management in alignment with PAS 55, ISO 55000 and the IAM competency framework.</td>
<td>4 consecutive days 2.1 CEUs Exam on Day 4</td>
</tr>
<tr>
<td>Leadership for Shutdowns, Turnarounds and Outages</td>
<td>Maintenance Managers, Supervisors, Engineers, Planners, Project Managers, Outage Planners, Project Engineers, Managers responsible for shutdowns</td>
<td>Gain skills to navigate difficult situations and people, make effective decisions on resources, master time management, improve communication with diverse teams and handle the legal side to shutdowns.</td>
<td>2 consecutive days 1.4 CEUs</td>
</tr>
<tr>
<td>Leading People</td>
<td>People who are expected to produce results through people - including managers, supervisors and informal team leaders.</td>
<td>Identify the impacts of low trust and benefits of high trust. Understand how to talk about trust with others. Communicate clear expectations. Motivate team members. Create and implement a coaching plan.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Lean Maintenance</td>
<td>All levels of maintenance personnel, including Supervisors, Planners, Managers, Engineers and Maintenance Workers</td>
<td>Effectively eliminate waste in maintenance operations and projects, and use tools and processes to create a Lean organization.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Maintenance Planning &amp; Materials Management</td>
<td>People working in all areas of cross-functional support in a plant.</td>
<td>Develop Maintenance Planning and Scheduling and MRO Management objectives and targets to achieve reliability goals.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Operator Care</td>
<td>Production Supervisors, Operations Managers and Personnel, Maintenance Supervisors and Personnel, Team Leaders, Lean Implementers</td>
<td>Improve production performance and asset reliability with an Operator Care program. Make data-driven decisions to create effective Operator Care tasks and achieve operational stability.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Front-line Supervision, Quality Personnel, Team and Business Unit Leaders, Area Managers, Support Staff, Process Operators</td>
<td>Select and apply effective problem-solving methodologies and resolve problems that limit performance using five data analysis tools.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Reliability and Operations Excellence</td>
<td>Operations Directors, Site Managers, Change Managers, Operations and Maintenance Managers, First Line Supervisors, Reliability Leaders</td>
<td>Apply operations excellence and reliability principles. Learn to deliver competitive advantage through asset productivity, defect elimination and workforce engagement.</td>
<td>2 consecutive days 1.4 CEUs</td>
</tr>
<tr>
<td>Reliability Excellence Fundamentals</td>
<td>Personnel involved in applying or are impacted by Reliability Excellence, and people who influence business process improvement.</td>
<td>Experience the fundamental concepts of Reliability Excellence in order to drive performance improvement efforts within your organization.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Train the Trainer</td>
<td>Subject Matter Experts, Instructors, Facilitators, Team Leaders</td>
<td>Acquire tools &amp; techniques to facilitate effective learning; motivate learners; develop measurable learning objectives; lead content-driven activities.</td>
<td>3 consecutive days 2.1 CEUs</td>
</tr>
<tr>
<td>Make Meetings Matter More! Facilitation Skills for Professionals</td>
<td>People responsible for hosting, organizing and leading meetings</td>
<td>Improve your meetings, from ending on time, to increasing participation, to getting the ever-elusive decision actually made. Learn techniques to reach goals effectively and hold meetings that people actually want to attend.</td>
<td>2 consecutive days 1.4 CEUs</td>
</tr>
</tbody>
</table>
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 government 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. That led to larger questions about how they could monitor and extend the reliability of additional Navy systems, particularly the mechanical and electrical systems, during their entire life cycle.

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.

LCE’s Reliability Consulting Group provides consulting, services and education that help organizations reduce risk, improve operating performance and engage their employees. LCE’s reliability team is a talented, diverse group successfully managing multiple, complex projects simultaneously... around the globe. 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. The Institute offers 22 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, University of Kansas and University of Alabama.
## Maintenance Management Skills
- Maintenance Managers and Supervisors, as well as Supervisors from Operations, Warehouse or Housekeeping areas

### Who Should Attend
- Maintenance Management, Planning and Scheduling.

### You will Learn How To
- 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.

### Dates & Location
- **Apr 25-27, 2017 (CHS)**
- **Sept 26-28, 2017 (CU)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Maintenance Planning and Scheduling
- Planner/Schedulers, Maintenance Supervisors, Maintenance Managers, Operations Coordinators, Store Room Managers and Purchasing Managers

### Who Should Attend
- Maintenance Planning and Scheduling.

### You will Learn How To
- Apply preventive and predictive maintenance practices. Calculate work measurement. Schedule and coordinate work. Handle common maintenance problems, delays and inefficiencies.

### Dates & Location
- **Feb 13-17, 2017 (CHS)**
- **March 13-17, 2017 (CHS)**
- **May 8-12, 2017 (CU)**
- **Jun 19-23, 2017 (CHS)**
- **Sept 11-15, 2017 (CHS)**
- **Nov 13-17, 2017 (CHS)**

### Days/CEUs
- 5 consecutive days
- 3.2 CEUs

## Materials Management
- Materials Managers, Store Room Managers, Planner/Schedulers, Maintenance Managers and Operations Managers

### Who Should Attend
- Maintenance Planning and Scheduling.

### You will Learn How To
- Apply sound store room operations principles. Manage inventory to optimize investment. Understand the role of purchasing. Implement effective work control processes.

### Dates & Location
- **Apr 11-13, 2017 (CU)**
- **Oct 24-26, 2017 (CHS)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Planning for Shutdowns, Turnarounds and Outages
- Members of the shutdown or outage teams, Planners, Plant Engineers, Maintenance Engineers

### Who Should Attend
- Planning for Shutdowns, Turnarounds and Outages.

### You will Learn How To
- 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.

### Dates & Location
- **Aug 22-24, 2017 (CHS)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Predictive Maintenance Strategy
- Plant Engineers and Managers, Maintenance, Industrial and Manufacturing Engineers, Maintenance Supervisors and Managers

### Who Should Attend
- Predictive Maintenance Strategy.

### You will Learn How To
- Collect and analyze data to assess the actual operating condition. Use vibration monitoring, thermography and tribology to optimize plant operations.

### Dates & Location
- **Apr 4-6, 2017 (CHS)**
- **May 16-18, 2017 (OSU)**
- **Sept 19-21, 2017 (KU)**
- **Nov 14-16, 2017 (CU)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Reliability Engineering Excellence
- Reliability Engineers, Maintenance Managers, Reliability Technicians, Plant Managers and Reliability Personnel

### Who Should Attend
- Reliability Engineering Excellence.

### You will Learn How To
- 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.

### Dates & Location
- **Feb 28-Mar 2, 2017 (CHS)**
- **April 18-20, 2017 (KSU)**
- **Oct 17-19, 2017 (OSU)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Reliability Excellence for Managers
- General Managers, Plant Managers, Design Managers, Operations Managers and Maintenance Managers

### Who Should Attend
- Reliability Excellence for Managers.

### You will Learn How To
- 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 Four.

### Dates & Location
- **Session 1 Dates:**
  - **Mar 21-23, 2017 (CHS)**
  - **Apr 25-27, 2017 (PR)**
  - **Aug 22-24, 2017 (CHS)**
  - **Oct 3-5, 2017 (MX)**

### Days/CEUs
- 12 days total
- (4, 3-day sessions)
- 8.4 CEUs

## Risk-Based Asset Management
- Project Engineers, Reliability Engineers, Maintenance Managers, Operations Managers, and Engineering Technicians

### Who Should Attend
- Risk-Based Asset Management.

### You will Learn How To
- 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.

### Dates & Location
- **Jan 24-26, 2017 (OSU)**
- **Mar 7-9, 2017 (CU)**
- **June 13-15, 2017 (KU)**
- **Sept 12-14, 2017 (CHS)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## Root Cause Analysis
- Anyone responsible for problem solving and process improvement

### Who Should Attend
- Root Cause Analysis.

### You will Learn How To
- 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.

### Dates & Location
- **Mar 21-23, 2017 (OSU)**
- **June 13-15, 2017 (CHS)**
- **Aug 15-17, 2017 (CHS)**
- **Nov 14-16, 2017 (CU)**
- **Oct 31 – Nov 2, 2017 (KU)**

### Days/CEUs
- 3 consecutive days
- 2.1 CEUs

## SMRP Body of Knowledge Guided Study
- Experienced maintenance and reliability professionals who want to attain the CMRP designation.

### Who Should Attend
- SMRP Body of Knowledge Guided Study.

### You will Learn How To
- 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.

### Dates & Location
- **Jan 31-Feb 2, 2017 (CHS)**
- **Sept 19-21, 2017 (CHS)**

### Days/CEUs
- 3 consecutive days
- Optional Exam on day 4

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**Location Codes:**
- (CHS) = Charleston, SC
- (CU) = Clemson University in Greenville, SC
- (KU) = University of Kansas
- (OSU) = Ohio State University
- (PR) = Puerto Rico
- (MX) = Mexico

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**Life Cycle Institute is a proud partner for the following university certificate programs:**

- Reliability Engineering Certification
- Maintenance Management Certification
- Reliability Engineering Certification
- Maintenance Management Certificate

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**Register Now!**

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