

Value Based Maintenance and Reliability Methods for: Petrochemical, Refineries, Utility, Bauxite and Process Plants.

Workshop: Date scheduled based on request



Applications of the Most Effective Maintenance Strategies and the Most Powerful Methods in the Reliability Toolkit

In today's highly competitive and cost conscious environment, companies are turning their full attention to effective maintenance and reliability strategies to drive higher levels of availability, utilization of asset and reduction in maintenance cost.

Are you getting the most from your assets?

THIS FOUR DAYS INAUGURAL MAINTENANCE AND RELIABILITY BASED SEMINAR IS FOCUSES ON:

- Quantitative methods to achieve high reliability and availability and optimize maintenance through **strategic application of scientific techniques**.
- Presenting a risk based maintenance methodology for **identifying the risk** that would result as a **consequence** of unexpected failure.
- Delivering **proven strategies** to successfully evaluate and operate reliability based maintenance programs in complex facilities.
- Demonstrating how **optimization techniques** are applied to model and analyze maintenance data and facilitate maintenance decisions.
- **Benchmarking** your traditional maintenance programs against **the latest strategies** in reliability and maintenance.
- Demonstrating how the cost associated with productive system equipment failures and downtime applies to the overall cost of unreliability and how this **impacts profitability**.

AVAILABLE AS ONSITE COURSE



WORKSHOP INFO.

Is your company ready to?

Adapt | Implement | Improve

Today's plant managers face increasing pressure from employers, customers and regulators to maintain cost-efficient operations that are less prone to failure and that are safe and efficient. An understanding of reliability methods and maintenance planning can help accomplish these conflicting goals.

Without adequate reliability and maintenance planning, even the most efficient and seemingly cost-effective equipment designs can incur enormous expenses due to repeated or catastrophic failure and subsequent search for cause.

This four day, comprehensive, hands-on seminar, designed for both the new and seasoned practitioner, provides you with all the tools you need to help initiate your maintenance and reliability analysis. Learn about the development and use of world class reliability and maintenance engineering techniques and applications for improving plant equipment availability in your company.

This course provides a comprehensive review of the various aspects of operational reliability and maintenance efficiency and effectiveness in **refineries, utility, oil & gas and petrochemical plants**. Principal emphasis is placed on the primary means of achieving plant reliability, which is the prevention of critical equipment failures, particularly, any which could cause significant consequences.

It builds on a **focused and practical coverage** of reliability engineering methods and selection and provides structured procedures and applicable calculation formula and methods for the equipment reliability. It also underscores the importance of interactions and cooperation between the three key functions of reliability engineering, operation and maintenance in achieving the optimum operational reliability and availability level in the plant. It enforces this key issue with practical examples of significant failures resulting from lack of understanding of the roles, responsibilities and interfaces between these functions.

With an accessible blend of mathematical rigor **and simplicity**, this course is the ideal workshop for novice and expert engineers seeking to increase performance and longevity of their company's assets, for the analysis and verification of equipment reliability and for maintenance planning.

Course Objectives

The key general objectives of this course are as follows:

- Provide assistance to participants in developing understanding and applying the various aspects of reliability engineering techniques to ensure operation efficiency in a responsible and cost-effective manner.
- Provide the means for enhancing the knowledge and skills of the participants in reliability evaluation and analysis; and in risk assessment and maintenance management.
- Provides participants with the latest practical, effective methods and engineering tools required to perform reliability and maintenance analyses.
- Provide comprehensive details of the fundamentals and specific techniques underlying the assessment of equipment reliability, detection and diagnosis of faults, and best practices for cost-effective reliability improvement.
- Gain an appreciation of the importance of reliability to equipment or system success. They will develop an understanding of the practices that are appropriate to apply for different operational situations as well as the basis of implementing the practices cost effectively.
- Develop and enhance their understanding of the tools and techniques for developing optimistic reliability and maintenance models of complex systems while utilizing inspection or failure data and information to estimate the parameters of such models.
- Develop knowledge of how to apply a more effective maintenance program when their company does not have enough time, resources or money to analyze all company's asset.
- Systematically apply a maintenance task analysis to achieve rapid results when implementing an equipment reliability strategy.

Training Methodology

This course combines sound maintenance and reliability engineering concepts, principles, methods, the best industry practices and proven solutions. It offers comprehensive coverage of basic probability and various methods of analysis. It presents both parametric and non-parametric statistical methods to allow selection of the most useful methods for a given set of data.

It places all models in context and demonstrates the mathematical principles and trade-offs between accuracy and experience. Actual industry case studies as well as organization's experience will be reviewed in depth to reinforce every topic.

The course also comprise of lectures, and interactive exercises to maximize participant's benefits. Additionally, an optional "Question and Answer" period is included to provide participant with opportunity to get expert answers on their specific questions.



Value Based Maintenance and Reliability Methods for: Petrochemical, Refineries, Utility, Bauxite and Process Plants.

Who should participate in this training?

This course is particularly valuable for process, utility, refinery and petrochemical plant technical managers, reliability engineers, inspectors, maintenance personnel, as well as for project and consulting engineers and engineering and technical personnel involved in plant maintenance and reliability.

Organizational Impact

- The company will be able to achieve measurable improvement in operational reliability, maintenance efficiency and effectiveness by identifying, adopting and implementing new reliability and maintenance methods recommended by delegates.
- The company will be able to use risk assessment methodologies to quantify and prioritize risks, and to allocate resources for optimum benefits.
- The organization will be able to enhance its ability to utilize risk-based inspection and maintenance resulting in lower life cycle costs while complying with codes and standards, and other regulatory requirements.
- The company is able to enhance plant profitability by adopting and applying worldwide maintenance and reliability techniques and methods.
- The company will be able to reduce cost of their maintenance activities by taking a pre-emptive approach.

Competencies Emphasized

- Reliability and maintenance analysis of equipment and systems in accordance with the latest world class techniques and approaches to develop an holistic maintenance program.
- Statistical methods and selection criteria for specific reliability analysis.
- The identification and assessment of equipment degradation mechanisms and the failures they may cause.
- Hazard identification, risk analysis and effective maintenance management.
- Application of risk-based methodologies in inspection and maintenance.
- Fitness-For-Operational Assessments.

Production Supervisors: Shall be exposed to new tools for understanding how reliability applications and effective maintenance can improve availability of their equipment. They will learn how to influence improvement in availability, how they can assist in reducing process failures.

Maintenance Engineers: will be able to identify and apply new engineering modeling techniques for maintenance optimization and predicting reliability of process based on how equipment is operated and maintained for justifying equipment reliability.

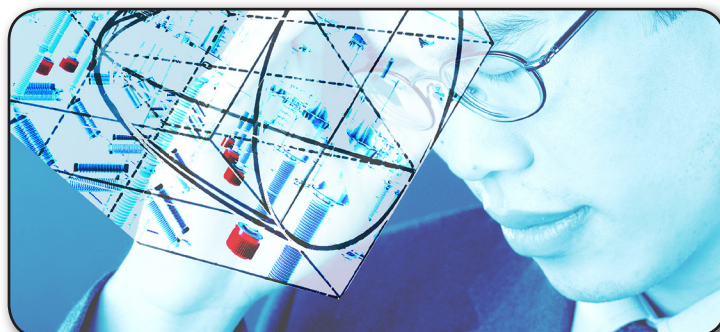
Managers: will find the business aspect of reliability applications helpful for measuring improvement in process, equipment operation, and to reduce cost of unreliability associated with equipment availability.

Maintenance Planning Personnel: They will find reliability tools and techniques helpful for understanding failure data in their CMMS systems, and how failure data is used to justify making equipment more reliable as a business decision.

Process Engineers: They will learn how to influence improvements in availability, how they can assist in reducing process failures, and learn how they can calculate the cost of unreliability for making business decisions to attack problems of unreliability.

Prerequisite

1. Elementary knowledge of matrices operation.
2. Basic understanding of probability and statistics.
3. Basic knowledge of the methods for solving simultaneous equations.
4. Basic knowledge of engineering maintenance strategies.





LEARNING OBJECTIVES

Personal impact after completion of training:

- Participants will enhance their knowledge and expertise in equipment reliability and maintenance strategy, and will be equipped with structured procedures and effective guidelines to perform maintenance and reliability calculations.
- Participant will gain a sound working knowledge of the interdependence of risk, operational reliability, and maintenance on the integrity, and cost-effectiveness of system or equipment availability.
- Participant will extend his or her knowledge of the requirements and application of maintenance management effectiveness, quantitative asset management, risk analysis, statistical methods applications in reliability and maintenance, and optimization methods applied to support maintenance decisions.
- Participants will enhance their ability and skills in maintenance and reliability analysis, failure detection and analysis, estimating failure consequences, and fitness for service assessment.
- Participants will enhance their core competencies and productivity thereby improves their particular strengths and performance levels as well as making additional value added contributions to their organizations.
- Participant will gain a working knowledge of the techniques of reliability engineering and the ability to apply them effectively in improving the maintenance, maintainability, and reliability of plant equipment.
- Participants will enhance their understanding of the general principles and practice of reliability centered maintenance and of condition monitoring, how to interpret the measurements and symptoms, and how to diagnose associated faults.

The Sky Is the Limit!

Expand your knowledge with this essential seminar specially created for your technical development.



Reliability



Productivity



Maintenance

Improve Productivity [20% - 25%], Reduce Risk, Vulnerability, & Maintenance Cost [25% - 30%]

Seminar Content * Course Code – PS MR 402

DAY 1 - Schedule based on seminar date

8:30 - Registration & Morning Coffee

9:00 - Chairman's Opening Remarks

9:15 AM - 10:45 AM - Module 1

Reliability Concepts and Applications

- Reliability Engineering Concepts
- Basic Definitions and Reliability Metrics
- Key Manufacturing Reliability Measures
- Need for Reliability in Manufacturing
- Reliability Application in Productive System
- How does Reliability Improves Profitability
- Operational Reliability Analysis
- Evaluating Cost Associated with Unreliability
- Cost Benefit of Investing in Reliability
- Understanding Reliability Specifications
- Reliability Improvement Process Steps

10:50 AM - 12:20 PM - Module 2

Introduction to Engineering Maintenance

- The Need for Maintenance
- A Generic Equipment Reliability Model
- Maintenance as a Business Process
- Maintenance Strategy and Policy
- Preventive Maintenance Concepts
- The Maintenance Cycle Model
- Fundamentals of TPM
- OEE Model Applications
- Analysis of Downtime
- Spare Determination
- Reliability Under Preventive Maintenance
- KPI Selection for Reliability Based Maintenance
- Introduction to Risk Based Maintenance Methodology

12:20 PM - 1:20 PM - Network Lunch



1:30 PM - 3:05 PM - Module 3

Probability Models in Maintenance and Reliability

Session 1 – Introduction to Probability

- Basic Concepts and Theory
- Basic Statistical Concepts
 - Modeling Distribution
 - Analytical Functions in Reliability
 - Statistical Distribution in Reliability
- Methods of Estimating Failures
- Example Applications of Distribution

Session 2 - Hypothesis Testing Applications

- Introduction to Hypothesis Testing
- General Idea of Hypothesis Testing
- Statistical Hypothesis Testing
- Procedure for Hypothesis Testing
- Testing Population Mean
- The F-Test Significance
- The Chi-Square [χ^2] Test of Significance
- Interactive Example Application

3:05 PM - Tea And Networking

3:30 PM - 5:00 PM - Module 4

Fundamentals of Maintenance Management

- Maintenance Management Methodologies
 - Concepts and Definitions
 - Maintenance Excellence
 - Key Performance Indicators
- The Maintenance Management Process
- Maintenance Control Methods
 - Maintenance Scheduling
 - CPM and PERT
 - Interactive Exercise
- Measuring Maintenance Performance
- Maintenance Management Efficiency Assessment
- Elements of Effective Maintenance Management
- Fundamentals of Asset Management Applications

5:10 - Chairman's Closing Remarks

Seminar Content * Course Code – PSMR 402

DAY 2 - Schedule based on seminar date

8:30 AM - Registration And Morning Coffee

9:00 AM - Chairman's Opening Remarks

9:15 AM - 11:15 AM - Module 5

Productive System Reliability Models

Session 1 - System Reliability Models

- Basic Series Reliability
- Basic Parallel Reliability
- Standby Redundancy
- K-out-of-N Configurations
- Interactive Exercise

Session 2 – RBD Modeling of Productive System

- Introduction to RBD Modeling
- Methodology for Developing RBD
- Application of RBD
- Example Application of RBD
- Case Study Example Application

Session 3 – Availability of Production System

- Introduction to Availability
- Availability Classification
- Availability of Repairable System
- Determining System Availability
- Impact of R&M on Operational Availability
- Factors that Affects Availability
- Interactive Exercise

11:15 AM - 11:30 AM - Coffee and Networking

11:30 AM - 12:45 PM - Module 6

Methods for Collecting and Analyzing Data

Session 1 – Introduction to Data Collection Method

- Function of DCS
- Reliability Data Collection
- Reliability Event Data
- Operation of a DCCAS
- Empirical Method of Analysis
- Methods of Data Collection

Session 2 – Reliability Trend Analysis

- Facts about Trend Analysis
- Trend Analysis Application
- Concept of a Point Process
- Graphical means to Determine Trend
- Laplace Test Statistics
- Interactive Exercise

Session 3 – Industrial FRACAS Application

- FRACAS Application
- Inputs and Outputs
- Sample Report Forms
- FRACAS Responsibilities
- FRACAS Effectiveness
- FRACAS Process Flow

Session 4 – RCFA Reliability Application

- Definitions of RCA
- RCA Methods
- Criteria for Selecting RCA Methods
- Applying RCA to Improve Reliability
- Principle of RCA
- Key to Successful Deployment

Session 5 – CMMS Data Application

- CMMS Function
- Reliability Event Data
- CMMS Sample Data Form
- Goals For CMMS Implementation
- CMMS Selection Process

12:45 PM - 1:45 PM - Networking Lunch

2:00 PM - 4:30 PM - Module 7

Reliability Based Maintenance Optimization

- Integrating of RCM and Production
- RCM Technology and Concepts
- Candidates for RCM Analysis
- Reliability Centered Maintenance Process
- Methods for Selecting Equipment for RCM
 - FMEA
 - PSA Model
 - Risk Analysis
- RCM Model Analysis
- Interactive RCM Exercise
- RCM Implementation Approach
- Auditing Reliability Centered Maintenance Analysis

5:10 PM - Chairman's Closing Remarks

Seminar Content * Course Code – PSMR 402

Day 3 – Schedule based on seminar date

8:30 - Registration & Morning Coffee

9:00 - Chairman's Opening Remarks

9:15 AM - 10:45 AM - Module 8

Quantitative Techniques for Asset Management

9:15 AM - 10:45 AM

Session 1 – Statistical Techniques

- Identifying Failure Distribution
- Application of the Histogram
- Reliability Analysis Case Study
- Determining Reliability from Output Data
- Statistical Solutions for Maintenance Problems
- Age Replacement Example Application

10:50 AM - 12:20 PM

Session 2 – Weibull Application in Reliability

- Use of Weibull Application in Reliability
- Effect of the shape Parameter
- The Weibull Distribution
- Understanding Weibull Distribution
- Software Application for Weibull Analysis
- Weibull Analysis Interactive Exercise

12:20 PM - 1:20 PM - Network Lunch



1:20 PM - 3:20 PM

Session 3 – Operation Analysis and Maintenance

- Probability Models for Breakdown
- Queuing Applications in Maintenance
- Optimization Methods in Maintenance
 - MDP and Solutions in Maintenance
 - DP Appliance in Maintenance
- Dynamic Programming Interactive Exercise

3:25 PM - 3:55 PM - Tea And Networking



4:00 PM - 5:00 PM

Session 4 – Reliability Growth Application in Maintenance

- Overview of Reliability Growth
- Reliability Growth Analysis Procedure
- Reliability Growth Parameter Estimation
- Reliability Growth Software Application
- Predicting Failure from Maintenance Record
- Determining Optimum PM Schedule

5:10 - Chairman's Closing Remarks

Seminar Content * Course Code – PSMR 402

Day 4 – Schedule based on seminar date

8:30 - Registration & Morning Coffee

9:00 - Chairman's opening remarks

9:15 AM -10:45 AM - Module 9

Quantification of Equipment Reliability

Session 1 – FTA for Reliability Risk Assessment

- Common Use of FTA Application
- Role of FTA in Decision Making
- Fundamental Approach to FTA
- Constructing FTA Diagrams
- Probability Evaluation of FTA
- Success Tree Analysis
- Interactive FTA Exercise

Session 2 – Reliability Analysis of Repairable Systems

- Patterns of Failure
- Methods of Analyzing Repairable Systems
- Non-parametric Analysis Application
 - Renewal Method
 - Non-Homogeneous Poisson Process [NHPP]
 - NHPP with Power Intensity
- Parametric Analysis Application
- Use of Software Application to Perform Analysis
- Interactive Exercise

10:50 PM - 12:20 PM - Module 10

Condition Monitoring Approach

- Introduction CBM Techniques
- Selecting CBM Techniques
- CBM using the P-F Interval Threshold
- Basic Methods of Condition Monitoring
 - Infrared Thermography
 - Vibration Monitoring
 - Performance Monitoring
 - Oil Analysis
- Risk Based Approach to CBM
- Optimizing CBM

12:20 PM -1:20 PM - Networking Lunch



1:25 AM - 4:30 AM - Module 11

Interactive Solutions Finding Session

Case Study Presentation

Total of eight case studies to be presented 15 – 20 minutes allowed per group.

1. Option 1 – Select topic from a group that includes:

- Weibull Analysis.
- RCM Application.
- Availability Analysis.
- Risk Based Maintenance.
- Maintenance Management.
- Repairable System Analysis.
- Reliability Growth Application.
- Condition Based Maintenance.

2. Option 2 - Case study selected from delegate company daily maintenance or reliability challenges and solutions presented.

Researched and Developed by LebenTech.

4:30 PM - 5:00 PM - Presentation of Certificate



5:10 PM - Chairman's Closing Remarks

DETAILS OF YOUR COURSE PRESENTER

Lennox Bennett



Lennox is an engineering consultant with more than 20 years in the field of education and the private sector. He worked eleven years as a professional engineer, eight of which was spent as a reliability and manufacturing engineering consultant. His experience spans the following industries: education, consumer products, defense, printing, aviation and manufacturing. During the last eleven years he worked internationally with numerous organizations, providing support in their manufacturing process analysis, reliability program planning and development, reliability testing and analysis, and application of specialized reliability techniques to their process and product.

Mr. Bennett has three years formal training in Industrial Technology teaching and training students in technical schools as well as employee from various industries. He taught manufacturing process applications and mechanical engineering drawing and design. During his tenure as a teacher 80% of his students were successful in scoring a B-Grade or higher in their internal or external engineering examination.

Lennox is the lead consultant for LebenTech Innovative Solutions Inc. Previously he worked as a Sr. Reliability Engineer and has provided consulting services in the capacity of design verification engineer, manufacturing process engineer, quality engineer, RMA engineer, and reliability test engineer to companies such as: Sunbeam Products Inc, Maytag Appliance, Motorola, General Electric Appliance, Lockheed Martin, and Xerox. As a consultant he has applied various reliability techniques to validate, improve, and optimize product designs. He has also applied numerous manufacturing strategies to develop and optimize manufacturing process operations.

He also worked as manufacturing engineer in a metal fabrication facility where his responsibilities include asset and process management. He was instrumental in the maximization of asset utilization and production efficiencies. He offers deep experience and expertise, including knowledge of best practices, and has made tremendous impact in the manufacturing, quality, teaching and reliability field of service.

He holds a Master of Science degree in Engineering with a concentration in Industrial Engineering from the California Polytechnic State University. He is the recipient of a Bachelor of Science degree with a specialization in Manufacturing Engineering from the University of Miami. He also has to his credit a diploma in Industrial Technology and professional certification in Industrial Management from the College of Arts Science and Technology. He is trained and certified as a Six Sigma Black Belt.

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Workshop • Date scheduled based on request

PRICES AND OFFERS

Early Bird Discount:

- I am registering 3 months before to save US \$400 off the seminar price

Seminar Information	Normal Price
<input type="checkbox"/> 4 Days Seminar	US \$2395
<input type="checkbox"/> Register on or 2 months before	US \$2195
<input type="checkbox"/> Register on or 1 month before	US \$2245

DELEGATE DETAILS

Please photocopy for additional delegates and or delegate with different address

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Name: _____

Email: _____ Telephone: _____

Job Title: _____ Department: _____

Organization: _____ Nature of Business: _____

Address: _____

Postcode: _____ Country: _____

Telephone: _____ Fax: _____

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Name of person completing form if different from delegate

Signature: _____ Date: _____

I agree to LebenTech's payment terms

No. of employees: 1-3 3-5 5-10 10-15

Please indicate if you have already registered by Phone Fax Email

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Please debit my credit card: Visa MasterCard Amex

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Payment is required within 5 working days on receipt of invoice. If a booking is received 10 working days before the seminar, a credit card number will be taken to confirm your place. Likewise if full payment has not been received before the conference date.

5 WAYS TO REGISTER

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VENUE & ACCOMMODATION

VENUE: Location to Announced



Accommodation: Hotel accommodation and travel costs are not included in the registration fee. A reduced corporate room rate will be arranged at the hotel for attendees at this seminar. We will provide hotel contact information, so you can take advantage of this special rate. Kindly mention you are attending the Value Based Maintenance and Reliability for: Utility, Refineries, Petrochemical and Process Plants Seminar to obtain the special room rate.

SEMINAR DOCUMENTATION & AUDIO CD

- I am registering as a delegate, please send me an extra set of Seminar Documentation with Audio CD with a US \$50 discount: US \$300
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- I cannot attend the event, please send me the Seminar Documentation only at US \$290 (Plus shipping and handling Jamaica US \$6, Trinidad US \$12 & other countries US \$30.)

(N.B. Advance orders will determine whether or not this conference will be recorded - Please enclose payment with your order.) Your order is risk free! If not satisfied simply return the product within 15 days for a full refund.

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PROGRAM CHANGES - Please note that speakers and topics were confirmed at the time of publishing, however, circumstances beyond the control of the organizers may necessitate substitution, alteration or cancellation of the speakers and/or topics. As much, LebenTech reserves the right to alter or modify the advertised speakers and/or topics if necessary. Any substitution or alteration will be updated on our web page as soon as possible.

WORKSHOP CHANGES - Please note that the Seminar is subject to limited availability. Seminars may be conducted as closed forums and as such LebenTech reserves the right to decline individual registration as necessary.

YOUR DETAILS - Please contact our help center (call 954-786-7107 or send an email to info@lebentech.com) and inform them of any incorrect details which will be amended accordingly.

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Creating Progressive Maintenance Strategies for Power System Infrastructure

Fundamental Methodologies you can utilize to Transition from Reactive and Preventive to Predictive and Cost-effective Maintenance for Reliable Plant Operations.

In this seminar we are presenting an integrated approach to maintenance planning and reliability evaluation. **Value Based Maintenance and Reliability Methods for: Petrochemical, Refineries, Utility, Bauxite and Process Plants** provides comprehensive coverage of the fundamental concepts of reliability theory, basic models, and various methods of analysis. It incorporates numerous illustrative examples from the utility, bauxite, process and petrochemical industries and problems in each module. The first four modules sequentially provides an introduction to reliability and maintenance application in plant operations as well as the fundamental concepts of probability model applications in reliability.

This is followed by two modules on selected reliability methods used for evaluating equipment and system reliability and commonly used methods for collecting and analyzing reliability data. The next module provides an exclusive discussion on reliability centered maintenance for optimizing maintenance. This is followed by two modules of which one is focused on quantitative techniques applied in maintenance and reliability and the other on equipment reliability quantification. The course concludes with a module on condition based maintenance application and an interactive solution finding session.



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