

Maintenance Excellence Workshops

2010, Al Khobar, Saudi Arabia

8 Informative and intensive programs for Maintenance Professionals :

Advanced Maintenance, Planning, Estimating and Scheduling

15 - 17 May 2010

Advanced Maintenance Management & Leadership Skills for Team Leaders & Supervisors

18 - 20 May 2010

Preventive & Predictive Maintenance

12 - 14 June 2010

Zero Breakdown in Maintenance

15 - 17 June 2010

Root Cause Analysis

31 July - 2 August 2010

Measuring Maintenance Performance

3 - 5 August 2010

Continuous Reliability Improvement (CRI) for Rotating Equipment

1 - 3 November 2010

Maximizing the Value of Your CMMS Systems

6 - 7 November 2010

Trainer's Profile



Joel is by profession and choice an expert maintenance trainer and consultants in a wide variety of industries including pharmaceuticals, oil, airports, hospitals, high tech manufacturing, school systems, government, etc. He has also assisted previously Computer Cost Control Corporation to design & market Computerized Maintenance Management Systems to organizations including FedEx, United Airlines, JFK Airport, BFI, etc. He has also designed, installed and serviced a complete automation with rack control, accounting, and inventory control for BP North America's 30,000barrel/ day oil terminal as well as automation projects for Conrail.



Pete is a highly recognized leader around the World in the areas of implementing maintenance best practices, developing effective productivity measurement and initiating long term operational improvement processes, within both the public and private sectors.

His value as a consultant has been enhanced through his direct leadership and profit and loss responsibilities within large maintenance and manufacturing plant operations prior to focusing upon consulting.

He is the author of over 200 articles and publications. And as a frequent speaker, he has delivered speeches and seminars on maintenance-related topics worldwide in over 20

Kindly forward this brochure to anyone who might be interested

Course Overview

This course will help you achieve reliability and maintenance excellence. It is about implementing best practices for effective maintenance planning, estimating and scheduling. We will also help ensure you have other best practices in place for a profit centered operation. It will be tailored for participants from both plant and facilities maintenance operations that want to achieve measurable bottom line results. This program includes extensive practical exercises on key topics, extensive idea sharing and instructor's case studies from over 300 plant and facility sites. Each attendee will be exposed to today's most comprehensive benchmarking tool; The Scoreboard for Maintenance Excellence to complete prior to start date. Results will be strategic, tactical and operational and "Do It Now" plans of action for the 27 best practice topics we will cover.

The concurrent best practice training is included so that you can truly understand the full potential of your assessment results.

Course Outline

Day 1 Focus: Building the Foundation for Effective Planning, Estimating and Scheduling

- Introductions and TrueWorkShop Objectives
- Continuous Reliability Improvement of All Maintenance Resources
- Today's Maintenance Challenges-Planning is Critical
- Selling the Benefits of Planning and Scheduling to;
 - Management
 - Maintenance
 - Operations
 - Purchasing and the Storeroom
- Ensuring Your Maintenance Storeroom Supports the Planning Process
- How Planning and Scheduling Improves Craft Productivity
- Organizing and Managing a Maintenance Planning and Scheduling Process
- Planner/Scheduler Selection and Key Roles Responsibilities
- Planner/Scheduler Job Description Examples
- Maintenance Best Practices Needed for Effective Planning/Scheduling excerpts from;
 - The Scoreboard for Maintenance Excellence
 - The CMMS Benchmarking System
- Backlog Management and Defining True Maintenance Requirements to Management

Day 2 Focus: Planning and Estimating

- Steps for an Effective Planning Process
- Screening Work Request, Evaluating the Job for Scope of Work, Dealing with Scope Creep
- Informational Support-The Maintenance Technical Library
- Job Research, Detailed Planning and Breakdown of Job Steps
- Job Preparation and the Planned Job Package
- Getting Feedback on the Job Plan
- Coordinating Equipment Access, Permitting, Safety and Compliance Issues
- Detailed Planning of Materials, Tools and Equipment
- Responsibilities of the Planner/Scheduler to the Materials Management Process
- Materials Management's Support to Proactive, Planned Maintenance
- Why Reliable Planning Times and Estimating is Important
- Various Methods for Estimating and Work Measurement in Maintenance
- The ACE Team Process; A Consensus of Experts to Estimating Maintenance Type. (Note: A 2 day certification course is available following most of TMEI's 3 day planning, estimating and scheduling events.)

- Using Craft Experts for Developing Reliable Planning Times for Benchmark Jobs
- How the ACE Team Can Improve Repair Methods, Safety and Quality
- Developing Your ACE Team of Experts
- Key Steps in Developing Reliable Planning Times for Benchmark Jobs
- Using Benchmark Job Spreadsheets for Estimating Wrench Time
- Factors in Determining Total Planned Time for the Schedule
- Using the Job Estimating Worksheet for Total Planned Job Time for Scheduling

Day 3 Focus: Scheduling, Job Execution and Measurement of Results

- Successful Scheduling Requires Effective Backlog Management
- Coordination Required by Planners for Successful Scheduling
- Preparation for the Weekly Coordination Meeting
- Scheduling Techniques
- Preparing Schedules, Job Loading & Job Schedules
- Key Guidelines for Completing the Scheduling Process
- Supervisor Responsibility for Job Execution
- Handling Schedule Adjustments
- Job Close Out, Follow Up and Schedule Compliance Measuring Bottom line Results for Investments in Planning/Scheduling
- Measuring Performance of the Planning and Scheduling Function
- Measuring the Performance of the Overall Maintenance Operations
 - Selecting Key Performance Metrics
 - Developing a Maintenance Excellence Index
- Planner's Role in Project Type Work
- Dealing with Estimating Uncertainties (Estimating, Probability and Risk)
- Brief Intro to the Earned Value Analysis Technique for Major Projects
- Attendee Presentations of "Where Do We Go From Here"
- Conclusion and Final Review

Course Overview

This course combines leadership development with greater understanding of today's best practices for reliability & maintenance excellence. You will identify the real differences between managers and leaders. There is a big, big difference. True Maintenance Leaders must be the knowledge leader for new ideas, technology and Continuous Reliability Improvement (CRI). They must stay current or try to catch up before professional contract maintenance leaders overcome them. You will learn how to apply the best from strategies such as CRI, TPM, RCM, RBM (Risk Based Maintenance), planning, estimating & scheduling, MRO materials management, maintenance performance measurement, improving overall craft effectiveness (OCE) and overall equipment effectiveness OEE. You will also learn how to benchmark your maintenance operation with today's most complete tool and gain the leadership skills to implement your ideas for truly leading and moving beyond the status quo. This unique course will help you lead any type maintenance operation as a profit centered business.

Discover your own unique leadership style and leadership attributes you already possess.

Course Outline

Day 1:

Introductions: Trainer and Participants

- Sharing of Top 5 Areas for Improvement
- Project Work Teams Formed
- Discuss Team Presentations on Final Day
- Today's Maintenance Challenge- True Leadership is Key!
 - Plant Maintenance Operations
 - Facilities Maintenance Operations and other types of maintenance
- The Future of Maintenance Around the World and Leadership Needed by;
 - Top Leaders
 - Maintenance Leaders
 - Craft Leaders
- Ensuring that Basic Best Practices Are in Place.
- Developing Your Maintenance Excellence Strategy
- Using The Scoreboard for Maintenance Excellence To Define "Where You Are Now"
- OR: Using The Scoreboard for Facilities Management Excellence To Define "Where You Are Now"
- The Benchmark Assessment: An Excellent "Due Diligence" Process for New Maintenance Leaders
 - How to Conduct a Self-Assessment
 - How Best to Use Objective, Third Party Support
 - Defining "Where You Need to Go"
 - Measuring Your Results

The Maintenance Organization

- Building and Leading an Effective Maintenance Team
- Role of the Maintenance Leader and Top Leaders
- Craft Leaders and PRIDE in Maintenance
- Role of Planning, Estimating & Scheduling
- Role of MRO Storeroom and Purchasing
- Role of Preventive/Predictive Maintenance
- Emergency Maintenance: Handling the Unexpected

Important Maintenance Best Practices for Maintenance Leaders

- Making Reliability Centered Maintenance (RCM) Work for You
- Strategies for Total Productive Maintenance (TPM)
- Preventive Maintenance: Where is Your Return on Investment
- Predictive and Condition Based Maintenance: Sound Investments for Greater Reliability
- Using Risk Based Maintenance (RBM) as a Risk Management Tool
- Maximize the Value of your CMMS
- Using the CMMS Benchmarking System (SIDERAR-Argentina Steel Case Study on SAP)

Day 2:

Maintenance Planning and Estimating

- Benefits and Tools for Effective Maintenance Planning
- The Maintenance Budget
- Defining Backlogs and your Total Maintenance Requirements
- Estimating Methods
- Using The ACE Team Process for Reliable Maintenance Planning Times

Managing and Leading the Maintenance Staff

- Effective Scheduling Methods and Work Execution

- How to Measure and Improve Craft Productivity
- On-the-Job Training and Craft Skills Development
- Measuring Results from Planning and Scheduling

Modernizing Storeroom and Improving MRO Materials Management

- Storerooms: An Important Cornerstone for Effective Maintenance
- Key Requirements for Storeroom Excellence
- Maintenance Planning and Storeroom: Partners for Scheduling & Work Execution
- Requirements for Successful MRO Materials Management
- Are Contract Storerooms the Answer?

Day One and Two Reviews

- Summary of Day One & Two Key Topics
- Review Status of Team Presentations and Personal Plan of Actions
- Questions & Discussions

Day 3:

Controlling and Measuring Maintenance Work

- Developing Key Performance Indicators & Your Reliable Maintenance Excellence Index (RMEI)
- Validating True Return on Investments for Maintenance Best Practice Implementation
- Documenting Your Total Maintenance Requirements
- Preventive & Predictive Maintenance
- Corrective Maintenance
- Deferred Maintenance
- Emergency Work
- Convenience Work
- Minor Project Work Billed to Customer
- Project Work Billed to Customer
- In House Completion of Contracted Work: A Sad But True Occurrence

Maximizing Contractor Performance: (The Next to Last Topic But Critical for Many Operations)

- Why TMEI Strongly Supports In-House Maintenance
- Why TMEI Supports Contracted Maintenance as the Last Option?
- How TMEI Helps Contract Maintenance Providers Help You.
- Key Elements of an Effective Maintenance Contract
- Key Criterion for Contractor Selection
- Improving Contractor Performance: Ten Key Steps

Continuous Reliability Improvement and Leadership in Maintenance

- Continuous Reliability Improvement of All Maintenance Resources
- How to Successfully Audit Your Maintenance Organization
- Developing Your Plan for Reliability and Maintenance Excellence
- Summary
- Presentation of Participant Improvement Plans

Course Overview

Preventive Maintenance (PM) is the first line of defense for your physical assets, whether they are in a manufacturing plant, a university facilities complex, a hospital, a fleet of delivery trucks, a sports arena or a golf course. PM is that very important first step of performing PM tasks based upon time interval, miles or operating hours. And where PM leaves off, Predictive Maintenance (PdM) needs to take over and provide a “prediction” of potential failures based upon actual operating conditions.

This workshop will also briefly cover two more strategies that go way beyond PdM, Reliability-Centered Maintenance (RCM), and Risk-Based Maintenance (RBM). This practical course will:

- Present in detail the key elements of PM and PdM maintenance approaches plus RCM and RBM
- Explain their positive impacts on equipment reliability, productivity, and cost of maintenance
- Describe how to develop and install a tailor-made P/PdM program to obtain these results

It is an important “How to Do it Guide” for implementing, measuring results and successfully applying today’s best practices for Preventive (PM) and Predictive Maintenance (PdM). This course will help ensure you have other basic practices in place for a profit and customer-centered operation.

Course Outline

Day One:

Introductions, Participants Review Areas for Improvement and Select Project Teams

- Today’s Maintenance Challenge
- Maintenance Around the World
- How to Ensure Other Best Practices are in Place
- Developing Your Maintenance Excellence Strategy (Boeing Case Study)
- Using The Scoreboard for Maintenance Excellence to Define “Where You Are Now”

The Maintenance and Equipment Audit: Key Step before Starting PM/PdM

- Determine your current maintenance productivity
- Establish your current equipment condition and equipment performance (baseline)
- Determine the need for PM and PdM
- Calculate costs and benefits of P/PdM

Determining the Right PM System for Your Type Maintenance Operation

- Different types of PM
- PM organization and staffing PM Techniques
- How to determine PM requirements for your equipment
- Equipment cleaning and lubrication
- Equipment inspections, adjustments and servicing

Day Two:

How to Develop and Install a Good PM System

- The 10-step PM installation program
- Keeping an effective and useful equipment history
- PM work orders/PM checklists/PM reports

How to Plan and Schedule PM and Measure Results

- Determining PM frequencies and how to schedule PM
- Time-based or usage-based scheduling
- How to measure PM effectiveness and results
- Measuring and analyzing downtime and downtime trends

Predictive Maintenance Techniques, Applications, and Instrumentation

- Elements of PdM (mechanical and electrical)
- Equipment condition monitoring
- Predicting potential equipment breakdowns or expensive repairs

Specific PdM Techniques and Applications

- Vibration analysis/monitoring

- Shock pulse method
- Spectrographic oil analysis
- Ferrographic particle analysis
- Thermography/temperature measurement
- Non-destructive testing (NDT)
- Ultrasonic testing, and more

Day Three:

Getting Organized for PdM

- Planning for PdM; the preparatory steps
- Starting with a PdM pilot program
- Scheduling PdM
- Combining PdM with PM for greatest overall effect and least cost
- Organizational requirements

Measuring Results of PdM

- PdM database/data collection
- Costs of PdM (equipment/instruments, labor, and services)
- How to determine PdM benefits and return on investment (ROI)
- Decision factors for in-house vs. contracted PdM

Components of a Well-Organized P/PdM Program

- Equipment inventory/numbering system
- Spare parts inventory/forecast
- Sequence of tasks (PM and PdM routes)
- Equipment and maintenance performance indicators and trends

Combining Planned Maintenance, PM, Pd and TPM for Best Overall Results at the Least Costs

- Custom-making your maintenance system based on your equipment, plant location(s), and plant size
- Selling your solution to management (and getting the budget and management commitment)
- Phased installation for guaranteed results

Other Important Maintenance Best Practices

- Continuous Reliability Improvement (CRI)
- Making (RCM) Work for You
- Strategies for Total Productive Maintenance (TPM)
- Using (RBM) as a Risk Management Tool
- Maximize the Value of Your CMMS
- Using the CMMS Benchmarking System (SIDERAR Case Study on SAP)

Course Overview

Successful Zero Breakdown Maintenance is built on three fundamentals. The first is zero breakdown equipment needs low-stress parts kept in good health. The less fatigued the parts, the more reliable and failure-free will be your equipment. The second requirement for zero breakdown maintenance is to stop human error from causing plant and equipment failures. The better your people know how to prevent degradation and produce maximum reliability, the longer will your plant run well. The third premise is that you want world-class equipment performance. This means removing all the operational risks your equipment experience. The more integrated your operational risk management is across the equipment life cycle, the more certain you are to get zero breakdowns and always deliver low production costs and low maintenance costs.

This Zero Breakdown Maintenance course was developed by world-leading maintenance management professionals with enviable track-records of exemplary plant and equipment maintenance performance and workplace improvement.

Course Outline

Day 1 – Introduction to Equipment Reliability Concepts

Activity 1 – Identify failure problems and issues Attendee are facing at work

1. Limitations of Machines and Materials

- Understand How Machines are Designed and the Limits They Must Live Within
- Strength of Materials Limitations
- The Degradation Cycle
- The Overload Cycle

2. Determining the Reliability of Parts

- What is Reliability?
- Drawing the Reliability Curve
- Failure Rate Variation
- 'Reading' Failure Curve Shapes

3. Reliability of Complex Parts

- Modelling Reliability of Complex Parts
- Reliability Mathematics in 'Random Failure' Zone
- Failure Rate and Reliability Curves
- The Odds of a Part Surviving For Longer

4. Reliability Prediction

- Using Weibull Curves for Failure Prediction
- Maintenance Strategies for Parts and Components
- Reliability of Series Systems
- Reliability of Parallel Systems
- Activity 2 – Calculate reliability of processes

5. Reliability of Machines

- Reliability of Machines in Series Process
- Improving the Reliability of Machines
- Meeting The Reliability Challenge
- Modelling Machine Reliability

6. Instilling Reliability Principles into Maintenance

- Best Practice Reliability Engineering Application
- Quality Function Deployment – The Voice of the 'Customer'
- Failure Mode and Effects Analysis
- Crow-AMSSA Reliability Growth Plotting

Day 2 - Introduction to Profit Centred Maintenance

7. The Business of Maintenance

- Turning Maintenance into a Profit Centre
- Develop a Plan to Reach Mastery
- Turn Objectives into Systematic Activities
- Elements of a Good Management System
- Strategic Business Importance of Reliability

8. Maintenance Strategy Choices

- Maintenance Strategies for Risk Reduction
- Maintenance Strategy Selection
- Move from Reactive... to Proactive... to Risk Reduction

9. Selecting Maintenance To Deliver Reliability

- Equipment Reliability Strategies
- Precision Operation Extends Productive Life
- Failure Prediction Mathematics – Weibull Reliability of Parts and Components
- Implications of Reliability on Maintenance
- Strategies for Reliability Improvement

10. Maintenance Is a Risk Management Strategy

- Base Maintenance on Operating Risk Matrix
- Match Maintenance and Operating Practices to Equipment Criticality
- Activity 3 – Match operating and maintenance requirements to criticality
- Condition Monitoring to Optimise Availability
- Determine Component-Based PM Frequency by Statistical Analysis
- Activity 4 – Imbedding good practice PM and PdM into organisations
- Benefits of Failure Elimination

11. Continually Improving Maintenance and Reliability Results

- Root Cause Failure Analysis (RCFA)
- How RCFA Contributes To Improvement
- Risk Identification and Removal Worksheets
- Journey from Repair-focused to Reliability-focused Culture
- Improving Reliability by Setting Maintenance KPIs and Measuring Outcomes

Day 3 – Maximum Life Cycle Profit Maintenance

12. Run Your Maintenance for Profit

- When You Design a Plant You are Designing a Business
- Design and Operating Cost Totally Optimised Risk (DOCTOR)
- Eliminate Defects to Prevent Problems
- Defects and Failures True Costs
- Benefits of Reducing Operating Risk

13. Managing Risk in Your Business And Operations

- Quantify the Financial Cost of Risk
- Determine Your Acceptable Failure Domain
- The Application of Risk Based Principles to Managing Maintenance
- Reduce Risk with Chance Reduction and Consequence Reduction Strategies

14. Use Precision Maintenance and Precision Practices for Failure-Free Operation

- Precision Maintenance: Ultra-High Reliability Strategy
- Precision across entire 'equipment system'
- Typical Precision Maintenance Program Content
- Typical Standards for a Precision Maintenance Program
- Accuracy Controlled Enterprise (ACE) Procedures

15. Getting Operators To Drive Equipment Reliability

- Operator and Maintainer Watch-keeping Tools
- Use Visual Management to show Progress and Feedback
- Train Operators and Trades in Precision

16. Modernize, Systematize and Standardize Your Maintenance Processes

- Quality Management System for Continual Maintenance Improvement
- Remove variation ... by setting standards and measuring accuracy
- Prevent failure ... by defect elimination
- Risk control ... by chance reduction risk management
- Accuracy control ... by precision domain practices
- Measure/Monitor/Improve Performance by process step value contribution
- The Continuous Improvement Journey

17. Open discussion of means to address Attendees problems from Day 1

Review Course Learning

Close-out and Finish

Course Overview

While it is often used in environments where there is potential for critical or catastrophic consequences, this is by no means a requirement. It can be employed in almost any situation where there is a gap between actual and desired performance. Furthermore, RCA provides critical info on what to change and how to change it, within systems or business processes. Significant industries using root cause analysis include manufacturing, construction, healthcare, transportation, chemical, petroleum, and power generation. The possible fields of application include operations, project management, quality control, health and safety, business process improvement, change management, and many others.

Your problems may not be as spectacular as the ones pictured above, but they probably have many similarities under the surface. This is the point of root cause analysis -- to dig below the symptoms and find the fundamental, underlying decisions and contradictions that led to the undesired consequences. If you want your problems to go away, your best option is to kill them at the root.

Course Outline

Day 1 – Introduction to Root Cause Failure Analysis (RCFA)

1. Introduction to RCFA

- Successful uses of RCA in maintenance
- Words and definitions used in failure analysis
- Reasons for applying RCA in maintenance
- Understanding the physics of why equipment fails
- Activity 1 – identify failure problems and issues Attendee are facing at work

2. Equipment Failure

- True cost of failure
- Common causes behind equipment failures
- Understanding the human element
- Latent causes of failure
- Creative disassembly

3. Process Reliability

- Mapping work processes as activity chains
- Interconnectivity of work processes across the life cycle
- Human error rates
- Activity 2 - Calculating the reliability of work processes

4. The RCFA Process

- The RCFA Method
- Cause and effect diagrams
- Fault Tree Analysis

5. Selecting When to Use RCFA

- Risk – measurement and management methods
- Identifying the size of risk in an incident
- Pareto charting to identify the important few
- Selecting the scale of RCFA to apply
- Involving the right people in an RCFA

6. The Steps of RCFA

- Protecting the evidence
- Investigating, documenting, understanding the failure event
- Establishing the investigation team
- Assemble data and analyse

- Recommend corrective actions
- Report and review
- Implementing the RCFA recommendations

Day 2 – Review the RCFA Process

7. Guided Application of RCFA

- Review of RCFA process
- Activity 3 – case study of an RCFA
- Activity 4 – open discussion on RCFA process

8. Conduct an RCFA with the Group under Guidance

- Activity 5 – Entire Group of Attendees perform RCFA on a bearing failure
- Activity 6 – Open discussion on RCFA exercise learning

9. The Importance of Precision for Equipment Failure Prevention

- Avoiding failure in equipment
- Precisions standards for equipment to work to
- Instilling precision standards into work practices
- Working to precision standards

10. Introducing RCFA into an Organisation

- Recognition of a problem and its impact
- The Change Management Process
- Involving and getting buy-in from the right people

Day 3 – Apply the RCFA Process

11. Practice an RCFA

- Review the RCFA process
- Activity 7 – Groups of Attendees conduct short RCFA
- Activity 8 – Open discussion on practice RCFA learning

12. Open discussion of means to address Attendees problems from Day 1

Review Course Learning

Close-out and Finish

Course Overview

Performance measurement is a fundamental principle of management. The measurement of performance is important because it identifies current performance gaps between current and desired performance and provides indication of progress towards closing the gaps. Carefully selected key performance indicators identify precisely where to take action to improve performance.

This training deals with the identification of key performance indicators for the maintenance function, by first looking at the ways that maintenance performance metrics relate to manufacturing metrics. Since performance measurements for maintenance must include both results metrics and metrics for the process that produces the results, this document presents a representation for the business process for maintenance. The document then identifies typical business process and results metrics that can be used as key performance indicators for the maintenance function.

Course Outline

MEASURING MAINTENANCE PERFORMANCE

It was estimated in 1981 that of the over 600 billion dollars per year spent on maintenance, well over one third was wasted. Waste due to poor management of resources . . . poor measurement and control of labor, material, capital! In the year 2000, the estimated maintenance spending increased to \$1.2 trillion . . . do the math – how much is being wasted?

Not only that: Maintenance costs are higher than managers realize, because although they think the costs of doing maintenance are high, they don't often realize the costs of not doing maintenance right are even higher ... perhaps as much as 15 to 40 percent of total product cost (due to the 'hidden' costs such as breakdowns, lost production, lost time, late delivery, disorder, poor quality, high rework!)

This 3-day, 'hands-on' dynamic workshop devoted to helping you understand how to improve maintenance through more effective measurement of its contribution to the overall mission. A seminar/workshop of practical exercises, techniques, guidelines, and information that will enable you to develop consistent, useful, and relevant measures of performance for maintenance. You must know where you are before you plan on improving! Measure UP—Use the right metrics to drive

Why We Measure

The Maintenance Contribution - Serving the Business Need
The Systems Perspective

- Introduction to Systems and Processes
- Input-Output Analysis
- The 7 Key Measures of Organizational Performance
- Measurement Principles and Guidelines Introduction to Key Maintenance Practices and Measures

Introduction to Key Maintenance Practices and Measures

- Key Maintenance Practices and Measures
 - Managing Resources Productively
 - Key Practice Areas for Managing Maintenance Resources
- Measurement Ratios
 - Ratio Fundamentals
 - The Maintenance Ratios Table
- Surveys and Audits
 - Some Measures are More Direct Than Others
 - Types of Surveys and Audits
 - Example Surveys/Audits

Benchmarking: The Search for Best Practices Applying Measures to the Key Resource Categories

- Labor Utilization
- Materials Management
- Equipment Utilization The Data Cycle

Data Cycle—Data

- Data Cycle—Information
- Data Cycle—Analysis
- Data Cycle—Action
- Data Cycle—Evaluation

Implementing a Measurement Improvement Initiative

- The 10-Step Implementation Model
- Implementation Principles, Tools and Techniques Implementation Steps

Course Overview

Continuous Reliability Improvement (CRISM) and optimization of Rotating Equipment has been widely investigated by world-class process companies during the last decade. Concentrating exclusively on redundancy allocation as per the old fashion maintenance is not the answer. The modern approach requires that minimum reliability for each component be established to achieve the total equipment reliability goal with minimum cost. This new philosophy allocates reliability to a component according to the risk of failure and cost of increasing its reliability. Continuous Reliability Improvement (CRISM) of plant reliability by optimizing predictive maintenance for rotating equipment is one of the most important challenges plants face today. To know how to effectively prevent equipment failures, conduct a successful root cause failure analysis and improve condition monitoring for rotating equipment are continuing challenges for engineers. Proper analysis and solving of chronic problems at the source saves time and money. Most importantly, Continuous Reliability Improvement (CRISM) goes well beyond traditional reliability-centered maintenance (RCM) practices. CRISM as developed by your instructor, Founder of The Maintenance Excellence Institute will help improve the total maintenance operation for total operations success and profit. This intensive course focuses (CRISM) on rotating equipment but you will learn to apply much, much more for improving all maintenance resources via a profit-centered approach.

Course Outline

Day One:

Course Overview

- Continuous Reliability Improvement (CRISM)
- How CRISM goes well beyond RCM?
- What areas do you see needing improvement that impact reliability?

Organizing for a World Class Maintenance Operation

Exercise: Review of attendees' scoreboard for maintenance excellence results

- Characteristics of being world class
- Best reliability practices; Seven key reliability-centered maintenance (RCM) steps
- Discussions

CONTINUOUS RELIABILITY IMPROVEMENT OF ROTATING EQUIPMENT

Equipment Failure Patterns

- Distinguishing between repairable and non-repairable equipment
- Types of equipment failure
- Review why equipment fails
- Areas of the Bath-Tub curve
- Actual equipment failure patterns
- Actions to minimize failure effect
- How does most of your equipment fail?

Maintenance Practices and Their Impact on Reliability

- Different types of maintenance and organizational structures
- How maintenance influences equipment performance and reliability
- Factors contributing to excessive maintenance
 - Where is your plant on the maintenance strategy pyramid?
 - Has your plant implemented basic best practices?

Day Two:

Continually Reliability Improving Maintenance & Reliability Results Root Cause Failure Analysis (RCFA)

- Structured problem solving and RCFA
- Cause analysis
- Two-track approach
- Failure types
- The three levels of cause
- Collecting failure data

Root Cause Failure Analysis (RCFA)

- Parts and position
- The analysis process
- Describing the process
- Data Analysis I, II, III
- Human root causes
- Solutions to human root cause
- Stewardship of RCFA results

Exercise: RCFA practical exercise

Rotating Equipment Operating Problems

- 6 major rotating equipment problems
- Vibration, Balance and Lubricants and its control

Exercise: Operating problems with case studies on gearboxes, axial and centrifugal fans, compressors

- Looseness and its control
- Distortion and its control
- Alignment and its control

Exercise: Operating problems with case studies on pumps, bearings, valves, bucket elevators

Predictive Maintenance

- A proven strategy to get started or to renew a current program
- Classification of plant machinery
- Maintenance strategies as adopted to each class of machinery
- Identification of critical machinery and adoption of condition based maintenance
- Principles of predictive maintenance
- Detection and diagnosis
- Classical risk analysis methods
- How to base maintenance on operating risk matrix
- Risk identification and removal

Exercise: Risk analysis and maintenance strategy

Exercise: Developing a format for defining your asset criticality

Day Three:

Predictive Maintenance Techniques

- Vibration analysis
- Oil particle and wear debris analysis
- Thermography, its uses & case studies
- Ultrasonics & Performance evaluation

Component condition monitoring techniques

- Types of condition-based monitoring
- Vibration monitoring
- Pump monitoring frequency
- Temperature based monitoring
- Infrared monitoring
- Tribology, ferrography and lube oil analysis
- Discussions
 - What monitoring techniques are employed at your plant?
 - CBM case studies
- Analytical-case tools
- Data analysis
- Weibul analysis
- Discussions
 - Is CMMS providing data or true reliability information?
 - Is data routinely analyzed and used for decision-making?

Measuring results from continuous reliability improvement – Changing to reliability focus operation

Case study: Marathon Oil

- The CMMS benchmarking system
 - Evaluates existing CMMS' support to reliability of rotating equipment
 - Why CMMS implementation fail to achieve planned benefits
- The maintenance excellence index: A proven method to define your results to top leaders
- Key metrics and KPI's to consider for your maintenance excellence index

Exercise: Developing metrics and KPI's for your operation using the maintenance excellence index

Measuring results from continuous reliability improvement – Changing to reliability focus operation

Final exercise: Attendees presentations of their team's recommended plan of action for improving maintenance and reliability in their organizations

■ Course Overview

Just like many IT systems and program suites, the functionality of CMMS systems (of all types from SAP to MicroMain) are not fully utilized. Via The CMMS Benchmarking System, an exclusive from TMEI, you will see where you stand. And you will learn techniques to gain full value from an important maintenance investment. For IT staff members needing a better understanding of maintenance processes and true information needs, this course is for you as well. You will understand “why CMMS is not the solution”. But you will see that CMMS is the core requirement for a true maintenance business system integrating all maintenance best practices for bottom line, measurable results.

■ Course Outline

Day One:

- Introductions and Workshop Objectives
- CMMS: A Maintenance Business System for Profit and Customer-Centered Results
- How to Improve Operations Culture & PRIDE-in-Maintenance for CMMS Acceptance
- Return on CMMS Investment: Show Me the Money and Improved Customer Service!
- CMMS Success Stories and Case Studies
- Practical Exercise: Review of Participant’s CMMS Benchmarking System Results
- Improving Existing CMMS Databases
 - Physical Assets
 - MRO Parts/Material
 - PM/PdM Procedures
 - Standard Job Plans and Others
- Practical Exercise: Review Scoreboard Results and Define Priority of Best Practice Needs
- Understanding the Key Maintenance Best Practices Needed and That Effective CMMS Must Support
 - Storeroom & MRO Materials Management, Planning, Estimating & Scheduling, Work Management, PM & PdM
 - RCM & Continuous Reliability Improvement

Day Two:

- Practical Exercise: Review Prioritized Best Practice Needs of Participants
- How CMMS Can Improve:
 - Work Management and Control
 - Planning and Scheduling
 - Inventory and MRO Materials Management
 - Budget and Cost Control
 - Preventive/Predictive Maintenance and Reliability
- Working Smarter so CMMS Works for You
- CMMS Functionality Evaluation: Determining the Things Your CMMS Needs to Do
- Practical Exercise: Developing a Plan of Action to Increase Value of Your CMMS
- Achieving and Validating Results with Your Maintenance Excellence Index
- Continuous Reliability Improvement: Going Well Beyond TPM and RCM to Improve All Six Maintenance Resources
- Workshop Summary & Presentation of Attendee Plan of Actions to Improve CMMS within their organizations



Trainer's Profile



Joel is by profession and choice an expert maintenance trainer and consultants in a wide variety of industries including pharmaceuticals, oil, airports, hospitals, high tech manufacturing, school systems, government, etc. He has also assisted previously Computer Cost Control Corp. to design & market Computerized Maintenance Management Systems to organizations including FedEx, United Airlines, JFK Airport, BFI, etc. He has also designed, installed and serviced a complete automation with rack control, accounting, and inventory control for BP North America's 30,000barrel/ day oil terminal as well as automation projects for Conrail.

He is a leading maintenance trainer and consultant throughout the US, Canada, Middle East, Europe and Asia. He has trained over 15,000 maintenance professionals from 20 countries in 500+ sessions. 98% rated the training very good or excellent. Mr. Levitt is an established maintenance consultant and trainer and many large organizations have used his services.

Joel is an established author as can be witnessed by his 7 books on maintenance management.

- Managing Factory Maintenance, (1996 Industrial Press)
- Handbook of Maintenance Management, (1997 Industrial Press)
- Internet Guide for Maintenance Management, (1999 Industrial Press)
- Maintenance Planning, Scheduling and Coordination, (2001 Industrial Press)
- Managing Maintenance Shutdowns, Turnarounds and Outages, (2003 Industrial Press)
- Complete Guide to Preventive and Predictive Maintenance, (2004 Industrial Press)
- Engineered Performance Standards, in Facilities Operations Manager Handbook,(1999 McGraw Hill)

His teaching style is noted for its humor and plain straight talking. Expect to be introduced to a great deal of material, successful practices from around the world and have a good time as well.



Pete is a highly recognized leader around the World in the areas of implementing maintenance best practices, developing effective productivity measurement and initiating long term operational improvement processes, within both the public and private sectors. His value as a consultant has been enhanced through his direct leadership and profit and loss responsibilities within large maintenance and manufacturing plant operations prior to focusing upon consulting. He is the author of over 200 articles and publications. And as a frequent speaker, he has delivered speeches and seminars on maintenance-related topics worldwide in over 20 countries.

Pete has helped such diverse operations such as British Petroleum, Nigeria Liquid Natural Gas, UNC-Chapel Hill, Atomic Energy Canada Ltd, Boeing Commercial Airplane Group, Caterpillar, Ford, Honda, Polaroid, Lucent, Heinz, General Foods, BigLots Stores, Sheetz Inc, Marathon Oil Corporation, Great River Energy, Wyeth-Ayerst (US & IR), Cooper Industries, National Gypsum, Sarasota County Government-Operations and Maintenance Division, Carolinas Medical Center, NC Department of Transportation, NC Department of Health and Human Services and the US Army Corps of Engineers. Pete has helped achieve success and return on investment in plant, fleet, healthcare operations and pure facilities maintenance operations as well as golf course maintenance and for the "green industry"

He received both his BS Industrial Engineering and Masters of Industrial Engineering focused upon management information systems from North Carolina State University. He is also a graduate of the US Army Command and General Staff Course, the Engineer Officers Advanced and Basic Courses, the Military Police Officers Course and the Civil Affairs Officer Course. He is certified as a Total Quality Management facilitator for the National Guard Bureau and the North Carolina Army National Guard.

Professional Career:

President/Founder —The Maintenance Excellence Institute: Established The Maintenance Excellence Institute in 2001 with consulting and training services focused on maintenance process improvement in all types of operations within both the public and private sectors.

Principal — Tompkins Associates: Responsible for the creation and direction of the maintenance consulting practice within Tompkins Associates including support to sales, marketing and management of consulting projects.

Director of Facilities Management, — North Carolina Department of Administration: Managed 225-employee physical plant operation with over \$30 million annual budget and eight million square feet of facilities including the State Capitol of North Carolina. He was responsible for all physical plant operations, construction planning/renovation and inventory management.

Professional Associations: Pete is a member of the Association of Facility Engineers, the Institute of Industrial Engineers, the Society of Maintenance and Reliability Professionals, American Legion and Veterans of Foreign Wars. He has been involved in manufacturing operations management, systems MRP and CMMS implementations, facilities management, maintenance and governmental productivity consulting for more than 35 years.

Director, Productivity Management — North Carolina Department of Transportation (NCDOT) Managed an industrial engineering staff group that provided productivity and quality improvement services throughout NCDOT.

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