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BROCHURE EXAMPLE FROM SESSION IN BANGKOK THAILAND

MAINTENANCE SERIES

CONTINUOUS RELIABILITY IMPROVEMENT OF ROTATING EQUIPMENT

Increasing Productivity and Reducing Maintenance Costs through Outstanding Equipment Reliability

18th - 20th February, 2008 (Monday - Wednesday)
Westin Grande Sukhumvit, Bangkok, Thailand

Ralph W. "Pete" Peters

"Over 35 years of Engineering Experience"
International Trainer, Author, Engineer and Consultant
Founder/President
The Maintenance Excellence Institute (TMEI), USA

Your Workshop Take-Aways:

- **FOUR BENCHMARKING TOOLS in EXCEL FORMAT:**
  - ✓ The Scorecard for Maintenance Excellence maximizes overall best practices
  - ✓ The Computerized Maintenance Management System Benchmarking System optimizes your technology investment (CMMS)
  - ✓ The Maintenance and Excellence Index validates bottom-line results
  - ✓ The ACE Team Benchmarking Process assures reliable planning times
- **2 COMPLIMENTARY E-BOOKS**:
  - ✓ Maximizing Maintenance Operations for Profit-Optimization
  - ✓ Maximizing the Value of Facilities Management Operations.

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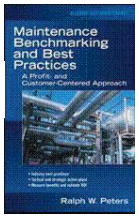

- **A MAINTENANCE TOOLBOX :**
  - ✓ Achieve Results from your Maintenance Audit
  - ✓ A Guide to Maintenance Excellence in your organization
  - ✓ Extensive material on the course CD that has been used in many consulting projects

Bonus For Early Bird Registration!

In addition to the 300 page course manual and extensive electronic references, Participants will receive the "***Maintenance Benchmarking and Best Practices***" book by **Ralph W. Peters** published by McGraw-Hill's Professional Book Division.

Limited to strictly the first 15 delegates on board!

The course will concentrate on the problems and solutions surrounding equipment failures, diagnostics and effective methods to prevent them. This will help achieve measurable results in more efficient plant maintenance, increased operational efficiency, lower operating costs and improved plant availability. Upon the successful completion of the course, participants will be able to gain the knowledge on the following:

- Organizing For World Class Operations and Total Operations Success
- Using The Scoreboard for Maintenance Excellence
- Key Elements of Reliability Centered Maintenance
- Important Risk Based Maintenance Concepts
- Equipment Failure Patterns
- Maintenance Affect on Reliability
- Root Cause Failure Analysis
- Predictive Maintenance
- Component Condition Monitoring Techniques
- Optimizing Reliability – Condition Monitoring And Predictive Maintenance
- Measuring Results and Return on Maintenance Investments (ROMI)

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About Your Expert Trainer:

As an all round guru of maintenance and reliability, Ralph W. "Pete" Peters has over **35 years of practical engineering expertise, operations management and maintenance international experience at the shop floor level and corporate levels**. Pete has taught companies in the US, Middle-East and Asia. He is the Founder/President of The Maintenance Excellence Institute (TMEI) and has helped operations such as **British Petroleum, UNC-Chapel Hill, Air Combat Command, Boeing, Heinz, General Foods, BigLots Stores, Marathon Oil, Polaroid, Great River Energy, Wyeth-Ayerst, Cooper Industries, National Gypsum, Lucent Technologies, Carolinas Medical Center and the US Army Corps of Engineers** achieve success in plant, fleet, healthcare and facilities maintenance operations. During his career he has performed over 300 Scoreboard for Maintenance Excellence assessments in over 20 countries.

He has served two manufacturing operations (Cooper Tools Crescent/Xcelite and Channel Master) as a Plant Manager. As Director of Facilities Management, he managed a 225-employee physical plant operation for the State of North Carolina. He also served as Director, Productivity Management Division, NC Department of Transportation and helped establish the first fleet maintenance management system in US. **Pete is author for *Maintenance Benchmarking and Best Practice* from McGraw-Hill, *The Guide to Computerized Maintenance Management Systems* , two E-Books and four maintenance chapters in various handbooks.**

He is also the author of over **200 articles and publications**. Pete is currently a frequent speaker worldwide and for his company's TrueWorkShops as presenter/facilitator and has delivered presentations on manufacturing and maintenance-related topics worldwide in over twenty countries. Pete received his BSIE and Masters in Management Information Systems from North Carolina State University.

Course Description:

Continuous Reliability Improvement (CRI℠) 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 (CRI℠) 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 (CRI℠)** goes well beyond traditional **reliability-centered maintenance (RCM)** practices. **CRI℠** 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 **(CRI℠)** on rotating equipment but you will learn to apply much, much more for improving all maintenance resources via a *profit-centered approach.*

This course is designed to explain the following:

- Effective methods of component condition monitoring for use as both a predictive maintenance
- The root cause analysis tool.
- Major failure causes
- World-class proven root cause analysis procedure with exercises and case histories
- Installation, pre-commissioning planning, functional testing and commissioning
- Preventive maintenance strategies and more…

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MAINTENANCE SERIES

CONTINUOUS RELIABILITY IMPROVEMENT OF ROTATING EQUIPMENT

Day One (18th February 2007 Monday)

8.30 **Registration & Coffee**

9.00 **Welcome & Introduction**

9.15 **Course Overview**

- Course Objectives
- Delegate Expectations
- Exercise: Review of Top 5 Priorities by Attendees
- Overview
- Discussions
  - i. Does your plant have a strong reliability improvement culture?
  - ii. Continuous Reliability Improvement(CRI℠)
  - iii. How CRI℠ goes well beyond RCM?
  - iv. What areas do you see needing improvement that impact reliability?
- What concerns and obstacles do you have in your current organization?

10.45 *Refreshment & Networking Break*

11.00 **Organizing for a World Class Maintenance Operation**

- Steps towards achieving maintenance excellence
- Your scoreboard for maintenance excellence
- Framework for reliability and maintenance excellence

Exercise: Review of attendees' scoreboard for maintenance excellence results

- **i. List ten characteristics of a reliability centered organization**
- **ii. Is your organization doing any of them?**

- Characteristics of being world class
- Best reliability practices; Seven key reliability-centered maintenance (RCM) steps
- Discussions
  - i. How well did we list characteristics?
  - ii. Are we practising elements of RCM or (CRI℠)?
- Are there any other characteristics that were missed?

12.30 *Lunch*

1330 **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
- Discussions
- How does most of your equipment fail?

15.30 *Refreshment & Networking Break*

16.00 **Maintenance Practices and Their Impact on Reliability**

- Today's maintenance issues
- The CMMS benchmarking system for reliable information
- Different types of maintenance and organizational structures
- How maintenance influences equipment performance and reliability
- Introduction to condition based maintenance
- Factors contributing to excessive maintenance
- Discussions
  - i. Where is your plant on the maintenance strategy pyramid?
  - ii. Has your plant implemented basic best practices?

17.15 **Wrap-Up of Day One and Assignment for Day Two**

17.30 *End of Day 1*

Who Should Attend?

Executives such as VPs, Directors, Division Heads, Managers, Superintendents, Specialists, Leaders, Supervisors, Foremen, Planners, Technicians and Engineers of the following departments:

- Plant
- Production
- Operations
- Maintenance
- Reliability
- Rotating
- Preventive Maintenance
- Process

From sectors such as: **Oil, Gas and Power, Petrochemical, Pharmaceutical, Water treatment plants, Automation, Construction, Food and Beverage, Mining, Textile, Printing (Pulp and Paper), Chemical etc.**

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CONTINUOUS RELIABILITY IMPROVEMENT OF ROTATING EQUIPMENT

Day Two (19th February 2008 Tuesday)

9.00 **Review of Day 1 & Introduction to Day 2 of 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

10.45 *Refreshment & Networking Break*

11.00 **Root Cause Failure Analysis (RCFA)**
- Parts and position
- The analysis process
- Describing the process
- Data Analysis I
- Data Analysis II
- Data Analysis III
- Human root causes
- Solutions to human root cause
- Stewardship of RCFA results

Exercise: RCFA practical exercise

12.30 *Lunch*

13.30 **Rotating Equipment Operating Problems**
- 6 major rotating equipment problems
- Vibration and its control
- Balance and its control
- Lubrication 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

15.30 *Refreshment & Networking Break*

15.45 **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

17.15 **Wrap-Up of Day Two and Assignment for Day Three**

17.30 *End of Day 2*

Internal Training

This training can be customized into an In-house training program just for your organization.

To find out more, please contact Alvin at:
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Training Methodology

This interactive training course constitutes of:

- **60% interactive workshop and lectures**
- **40% group work and practical exercises for effective learning!**

How to Get the Most from this Workshop

Be ready to review and discuss your plant's performance in light of the models presented, e.g., benchmarks, current production capability, losses from ideal and the state of the rotating equipment.

CONTINUOUS RELIABILITY IMPROVEMENT OF ROTATING EQUIPMENT

Day Three (20th February 2008 Wednesday)

9.00 **Review of Day 2 & Introduction to Day 3**

Predictive Maintenance Techniques

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

10.45 *Refreshment & Networking Break*

11.00 **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
  - i. What monitoring techniques are employed at your plant?
  - ii. Have they proven effective?
  - iii. CBM case studies
- Analytical-case tools
- Data analysis
- Weibul analysis
- Discussions
  - i. Is CMMS providing data or true reliability information?
  - ii. Is data routinely analyzed and used for decision-making?
  - iii. What kind of analysis is done?

12.30 *Lunch*

Course Customization to Your Priorities

Today's most comprehensive benchmarking tool; **The Scoreboard for Excellence Maintenance Assessment** (A Pre-Course Benchmarking Evaluation) will be issued to delegates immediately upon registration. This important pre-course work allows each attendee to address their Top 5 specific improvement needs and concerns. The trainer will discuss these needs at the workshop during a group practical exercise.

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

- The scoreboard for maintenance excellence
  - i. Defining global best practices and your baseline
  - ii. Defines "where you are"

Case study: Marathon Oil

- The CMMS benchmarking system
  - i. Evaluates existing CMMS' support to reliability of rotating equipment
  - ii. 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
- Other measures to validate reliability

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

15.30 *Refreshment & Networking Break*

15.45 **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

17.15 **Presentation of Certifications and Wrap-Up of Day Three**

17.30 *End of Day 3 & Close of Workshop*