

Presented by:



# *The Results Oriented Reliability and Maintenance Management Seminar*

## *The “what good looks like” Seminar*

*Sept. 20 - 23, 2010 – Metro Manila, Philippines*

*Venue: The Prestige Tower, Ortigas Center Pasig City*

*This seminar will bring Operations, Maintenance and Engineering closer together to form a “good” reliability maintenance partnership.*



## Meet the Presenter



Tor Idhammar  
Partner and Vice President  
IDCON, Inc.

He has worked in over 60 organizations in 13 countries in industries such as food, pulp and paper, mining, steel, oil and gas, chemical, and discrete manufacturing. Before working with IDCON, INC, he has experience from supply chain consulting with MA-systems and has served the Army. He possesses a Bachelors of Science in industrial engineering from North Carolina State University and a master of Science in mechanical engineering from Lund University, Sweden.

## *IDCON, Inc. – Maintenance Management Consultants*

Since the inception of Idhammar Konsult AB of Sweden in 1972, we have provided a range of maintenance management consultant services for our clients.

IDCON, INC is a highly specialized management consultant firm working within the industry to maximize productivity through improvement in maintenance and operations practices. All consultant services are based on the Results Oriented Reliability and Maintenance™ (RORM) philosophy. This philosophy has been developed by IDCON, INC over the years through project experience in the industry.

### **Our Products**

As maintenance management consultants, our products include education, training and implementation (consultant services) support covering:

- Current Best Practices (CBP) A training and assessment exercise
- Planning and Scheduling of maintenance work
- Preventive Maintenance/Essential Care and Condition Monitoring
- Basic Equipment Care for Operators
- Spare Parts management
- Root Cause Problem Elimination
- Results Oriented Reliability and Maintenance seminars
- Maintenance books, reliability books
- Operations and Maintenance Productivity Simulation
- Annual Reliability and Maintenance Conference
- International Reliability and Maintenance Benchmarking Expedition

### **Global Expertise**

Our approach, as maintenance management consultants, has been successfully applied in different industries in 43 countries within North America, South America, Europe, Asia and Australia.

### **IDCON, INC, Maintenance Management Consultants in Different Industries**

Our approach has been successfully applied in various industries such as: pulp and paper, steel, chemical, aluminum and mining. It has also been applied in the Fortune 500 manufacturing, automotive, electronics, utilities, food, and forestry products industries.

### **Impact the Bottom Line**

All of our products are designed to have a significant impact on the bottom line and generate substantial financial benefits.

### **Compatibility**

Our services and products have been successfully implemented and integrated with Total Productive Maintenance (TPM), Reliability Centered Maintenance (RCM), ISO 9000, Total Quality Management (TQM) and other maintenance and improvement concepts.



# Day 1

## Results Oriented Reliability and Maintenance Management

### Course Outline: Results Oriented Reliability and Maintenance Management

The purpose of seminar is to educate operations, maintenance and engineering in what good reliability and maintenance practices are and "what good looks like". The theme of the seminar is built up around how Operations, Maintenance and Engineering can work closer in a reliability partnership.

The seminar serves as an overview for all IDCON training programs and as a catalytic tool to help your organization discover and agree on improvement opportunities and what actions must be taken to close the gap between best practices and the way you work today. The Seminar content also includes examples on how you can achieve improvements.

Implementation of the discoveries from the seminar will result in increased quality production throughput and lower costs. This will be achieved through a better partnership between Operations, Maintenance, Engineering and other support functions such as stores.

### Master new knowledge that will last a lifetime:

- Understand the whole picture of how to achieve cost effective reliability
- Learn how to calculate financial impact of equipment reliability for your company
- Realize the new roles of operations, maintenance & engineering to achieve improved reliability
- Learn how different organizational structures may work
- Understand what good reliability and maintenance looks like
- Discover the power of identifying production bottlenecks and the reliability impact on those bottlenecks

### Who will benefit from this training:

Maintenance managers  
Maintenance supervisors  
Maintenance superintendents  
Maintenance or manufacturing engineers  
Engineer  
Engineering Managers  
Maintenance Planners

Plant Managers  
Vibration specialists  
Predictive maintenance specialists  
Lubricators  
Lubrication Engineers  
Operations managers  
Corporate Vice Presidents

### This seminar will cover the following topics:

- The development of reliability and maintenance in industry
- Automation's impact on maintenance
- Capacity of industry vs. number of workers
- Case studies of improvements in reliability and maintenance
- Improving equipment reliability is about changing people and work systems
- The right people in the right spot
- Operations role in reliability
- Maintenance role in Reliability
- Engineering role in reliability
- Maintenance philosophies available and what they are
- Mobility of management requires stronger work systems
- What manufacturing reliability is and how to measure it
- Overall Production Effectiveness (OPE)
- Mean time to break-down
- Life Cycle Cost, maintainability and reliability design
- Better reliability and impact on safety, revenues and cost.
- Example: How much is 1% improved reliability worth for the company
- What best performers do better than others
- Partnership work system between operations, maintenance, engineering and stores
- Roles and responsibilities, common goal, and work practices in a partnership organization
- Best reliability and maintenance practices methodology to identify improvement opportunities; develop improvement plans, guide implementation and measure progress of implementation and results
- Maintenance prevention
- Condition Monitoring
- Planning of work
- Scheduling of work
- Interface with stores
- Technical database requirements
- Optimization of preventive maintenance between operations and maintenance
- Root cause problem elimination
- Measure the processes with Key Performance Indicators (KPI's)

# Days 2 & 3

## Preventive Maintenance/Essential Care and Condition Monitoring

Learn the basic concepts to prevent and detect early equipment failures from the perspective of operations and maintenance. Discover how operations process care relates to maintenance equipment care. Do you want a better understanding of the design of a cost effective preventive maintenance system for operations and maintenance? This seminar will include a discussion of a failure developing period, life of components and consequence of failure analysis.

### *Master new knowledge that will last a lifetime:*

- Learn how to cost effectively optimize your preventive maintenance program
- Understand available techniques for preventing failures
- Learn about all available condition monitoring options
- Practically practice documenting full preventive maintenance tasks for equipment
- Discover how to financially prove results from preventive maintenance
- Learn the reliability basics such as equipment life, failure developing, and different maintenance methods
- Find out about the different implementation steps for improving preventive maintenance in your plant

### *Who will benefit from this training:*

Maintenance managers

Maintenance supervisors

Maintenance superintendents

Maintenance or manufacturing engineers

Engineer

Engineering Managers

Maintenance Planners

Plant Managers

Vibration specialists

Predictive maintenance specialists

Lubricators

Lubrication Engineers

Operations managers

### *Course Outline*

#### **Overview**

- Definition of Maintenance
- Do the right thing or do things right – are you focusing on the right things?
- Mission of PM/ECCM improvement
- Goal of PM/ECCM improvement
- Example of plant goal and mission statements statement
- Definition of Failure
- Definition of Break Down
- Definition of Failure Source
- Definition of PM/ECCM
- Exercise develop PM/ECCM definition

#### **Detailed Cleaning of Equipment**

- Detailed Cleaning Impact on Reliability
- Motor life
- Inspectability
- Mind set for detailed cleaning, what is clean

#### **Lubrication/Hydraulics for operations**

- Lubrication basics and purpose of lubricants
- Types of Lubricants
- Defining the measurements of oil cleanliness
- A micrometer – measurement for filtration
- How dirt enters systems
- How dirt effect component life
- Filter ratings
- Water in Oil
- Oil/ grease inspection methods
- Oil/ grease inspection tools
- Implementation of better lubrication practices

#### **Alignment for operation**

- Why align
- Alignment basics
- Understand how to detect misalignment
- Misalignment effect on bearing life

#### **Operating Procedures**

- How operating Procedures effect equipment reliability
- Examples: Parallel Systems
- Thermal Growth
- Water Hammer

#### **Bearings, Vibration and SPM**

- Speed Increase and bearing life
- Load increase and bearing life
- Exercise – calculate bearing life reductions while changing load and speed
- Lubrication, dirt, alignment problems combined
- Shock Pulse Measurement
- Vibration Pen
- Vibration Analysis
- Other inspection tools

#### **Couplings & stroboscopes**

- Coupling types
- Inspection of couplings
- Stroboscope basics
- Exercise - Inspection of gear coupling

## **Days 2 & 3** *continued*

# *Preventive Maintenance/Essential Care and Condition Monitoring*

### **Chain, Belt & Guards**

- Belt Basics
- Chain inspection
- Belt inspection
- Tensiometer
- Ultrasonic inspection
- Sheave guides
- Motor shelf

### **Material crack detection**

- Dye Penetrant
- Ultrasonic
- Eddy Current
- Magnetic powder

### **Corrosion & Heat exchanger**

- Corrosion
- Galvanic Corrosion
- Heat exchange inspections
- Exercise – Heat exchanger inspection

### **Temperature Inspections**

- Stickers
- Infrared gun
- Crayons
- Infrared Camera
- Examples applications for infrared cameras
- Exercise: IR-Gun ration calculation

### **Pumps and Mechanical Seals**

- Pump Basics
- Cavitation
- Seal types: Mechanical, packing, dynamic seal
- Seal inspections
- Exercise: Set up a PM program for a centrifugal pump.

### **Leaks**

- Cost of water leaks
- Cost of steam leaks
- Cost of air leaks
- Leak inspection – Ultrasound tools
- Leak detection – smoke
- Leak detection – soap water

### **Implementation of a better PM/ECCM process**

- Financial results
- Cut cost and/or increase reliability
- Charter/ Mission/ Goal
- How to benchmark current performance
- How does PM/ECCM affect RCFA/Planning/ Scheduling/Database/Stores
- What is the biggest opportunity in your plant?
- Assessment of your plant

### **Reliability Basics**

- Essential Care
- Maintenance methods Operate to Break Down
- Maintenance method Fixed Time Maintenance
- Maintenance Method Condition Monitoring
- Expected life of components
- Failure developing period
- Selection of most cost effective maintenance method
- Consequence of failure analysis
- Example Financial Calculation comparing Maintenance Method Costs

### **Document PM/ECCM**

- What is a route?
- What are shut down PM's?
- Decide PM/ECCM activities for sample equipment
- Who should inspect equipment?
- Decide inspection tools to use
- Software/ Hardware requirements
- Organize PM/ECCM in comprehensive format for users
- Reporting of PM/ECCM performance
- Exercise: Do financial calculation and decide what maintenance method to use
- Exercise: Document PM/ECCM for selected equipment

# Day 4

## Root Cause Problem Elimination

### Course Description

IDCON's Root Cause Problem Elimination training focuses on eliminating problems rather than just analyze them as the case is in the traditional RCFA. IDCON brings root cause analysis into your day-to-day reliability management process by integrating root cause into your current processes in a cost effective manner.

The training is a very unique class that primarily focuses on teaching all people in an organization the correct thinking behavior before teaching the documentation method to use. The training is based on fundamentals of critical and creative thinking applied to the root cause and troubleshooting processes. The thinking processes are used as a base when we are applying root cause to the different documentation methods. Your organization may use logic trees, fishbone diagrams, cause and effect charts or a specifically branded supplier documentation method. We can work with any of these to make your current process more effective. IDCON can also let you select a documentation method of your choice and use that method in our class.

### Key Learning Points

- Understand the mechanics of solving problems effectively
- Get introduced to the basics of critical and creative thinking
- Understand different ways to implement a root cause process in your organization
- Understand pros and cons for basic documentation methods such as logic trees, cause and affect analysis, fishbone diagrams, why-why, etc
- Understand how root cause becomes effective in your reliability program together with planning and scheduling, preventive maintenance, and technical database.
- Practice root cause analysis through exercises in the classroom.

### Who should attend?

The root cause problem elimination training is very useful to anyone in an organization that solves problem. This means more or less all in an organization. Some of the key people to attend are:

Plant Managers	Maintenance Planners
Maintenance managers	Vibration specialists
Maintenance supervisors	Predictive maintenance specialists
Maintenance superintendents	Lubricators
Maintenance or manufacturing engineers	Lubrication Engineers
Engineers	Operations managers
Maintenance and reliability engineers	Operators
Engineering Managers	Operations supervisors

### Course Outline

- Learning Objectives
- People are NOT "Natural Problem Solvers" – example of what usually happens – Tank Bubble Pipe problem from a plant
- Sample well known problems that made the news with catastrophic effect
- Root Cause Definitions
- Basic Beliefs: Possible Discussion
- Why RC problem elimination not failure analysis
- An Excellent RCPE process need basic PM and PS – Why?
- An example: Electronic Board Failure – How deep do we dig?
- An example: Gear box failure on a vacuum pump drive train
- Doubts when going through root cause in example above – Why dig deeper, why verify?

### Process Overview

- Root Cause Process Overview
- The Individual Thinking Process vs. Overall Plant Process
- Do you see problem – black hat thinking! Is this really OK?
- Why follow a thinking process? Isn't it an overkill – Exercise find the F's will illustrate that it isn't
- Exercise II – You think in engraved patterns Car and person
- Types of Problem we encounter, three typical examples: Routine, Linked, Major events

## Day 4 *continued*

# Root Cause Problem Elimination

### *Root Cause Thinking Specifying the Problem*

- When you see something wrong what do you do?
- Facts / Information Collection Checklist
- Problem Statement
- Exercise: Joe's Problem Statement
- Exercise: Sample Problem Statements. Good or Bad?
- Exercise: Plant Problem – develop Problem Statement
- Exercise: The Cards
- More about collecting facts
- White hat thinking
- Distinguish between Facts and Information – this is a fact because....
- Using digital camera for collecting facts
- Sources for collecting facts
- Documenting facts using a simple list (optional tree, fishbone, whatever you prefer?)

### *Root Cause Thinking - Developing Possible Causes*

- Look for Changes in time
- Look for Similar items – do they have the same problem?
- Frame the problem – Don't stray too much
- Coming up with possible causes requires CREATIVE THINKING – Green Hat
- Example: Changes in time, possible plant example?
- Example: Similar Objects, possible plant example?
- Possible Causes List

### *Root Cause Thinking- Select Most likely Cause*

- Compare each possible Cause with the facts in your lists
- Show process with example, possible plant example
- Did you make Assumptions? How to handle assumptions

### *Identify Possible Solutions*

- Slow down. Are there more than 1 possible solutions?
- Example: Vacuum pump
- Evaluating Ideas: Green, Black, then Yellow

### *Thinking about Thinking*

- Why one step at the time? We THINK better doing one thing at the time
- Critical Thinking
- Creative Thinking
- Exercise – 3 People enter a hotel
- Example: Do we base our opinions and decisions on facts or fiction?
- Bearings on Press arms
- The technique of the 6 thinking hats
- Suggested RCPE beliefs for Plant

### *Implementing the Business Process of RCPE in the Plant*

- Trigger – when do you start, go through, and/ or finish a RCPE
- Integrate Preventive Maintenance with RCPE
- Implementing the suggested Solution – the hardest part to get done
- Preparing and selling the solution
- An Example of Elimination vs. Analysis – the resin tank
- Suggested work flow for RCPE

### *Documentation options other than the list*

- Why-Why advantages and disadvantages
- Fishbone advantages and disadvantages
- Logic Tree advantages and disadvantages
- Cause and effect advantages and disadvantages

**Seminar Costs****Conference Registration:** USD \$1669 (plus 12% VAT)**Three Easy Steps To Register:****1 How many people are you registering for this conference?**

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- I am registering more than one person to be billed on the same invoice; there will be \_\_\_\_ registrations total  
\*make a copy of this registration form for each additional person.
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**Conditions****Terms of payment:** Following completion and return of the order form, full payment is required at least 2 weeks before the scheduled training. Receipt will be issued on payment. A 50% cancellation fee will be charged under the terms outlined below. We reserve the right to refuse delivery if payment is not received on time. Unless otherwise stated in the invoice. Payment may be made in US dollars or in Philippine Peso. The client agrees with the payment terms of Kontraktwerke, Inc.**Substitution and Cancellation:** Provided the total fee has been paid, substitutions are allowed at no extra charge if earlier than 14 days before the workshop. Substitution within 14 days before event-date will be allowed subject to an admission fee equal to 10% of total fee. Otherwise all purchase order carry a 50% cancellation liability immediately after signed sales contract has been received by KWI Phils. (as defined above). Cancellation must be received in writing by mail or fax six weeks before the conference to be held in order to obtain a full credit for any future KWI Phils. trainings. Thereafter, the full fee is payable and is non-refundable. The service charge is completely non-refundable and non-creditable. This serves as a sales contract. By signing this contract, the client agrees that in case of dispute or cancellation of this contract KWI Phils. will not be able to mitigate its losses for any less than 50% of the contract value. If, for any reason, KWI Phils. decided to cancel or postpone this workshop. KWI Phils. is not responsible for covering airfare, hotel or other travel costs incurred by client. The fee will not be refunded but can be credited to a future scheduled workshop. Event program content is subject to change without prior notice.

## Companies that have benefitted from IDCON training:

ABB  
Akzo-Nobel  
Alberta Pacific  
Alcoa American Home Foods  
Arch Coal,  
Arizona Chemicals  
Bahlsen Quality Foods  
Beyond Petroleum  
*(previously known as British Petroleum)*  
British Oxygen Company (BOC)  
Buckeye  
Conagra Foods  
DeVault Foods  
Dofasco Steel  
Flexsys  
Fonterra - New Zealand  
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Georgia Pacific  
Tarkett  
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## IDCON Reliability & Maintenance Books

IDCON is a management consulting company that specializes in helping industry maximize profits by improving reliability and maintenance practices.

The eight books are a unique collection developed by consultants who have spent their life working in industry. The books focus on practical hands-on tips and techniques.



To order online go to [www.idcon.com](http://www.idcon.com) and click on Bookstore or call us at **800-849-2041!**

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