

# Root Cause Failure Analysis

Understanding Machinery Failures

June 27 to 29, 2012, El Cielito, Sta. Rosa, Laguna



## Training Package Includes:

- Morning / Afternoon meals and Lunch
- 1 Complete Handouts on the course
- Selected Articles on RCFA
- Exercises and Handouts on RCFA
- Actual Case Studies on RCFA
- Video Showing on Challenger Explosion
- CD Copy of RCFA Training in ppt
- WCM Book – 314 pages
- Certificate of Attendance

## Who Should Attend:

- Maintenance Managers
- Failure Analysis Group
- Facilities and Utilities Managers
- Preventive Maintenance Group
- Predictive Maintenance Groups
- Reliability Engineers and Managers
- Maintenance Planners
- Production Supervisors
- Operations and Production Managers
- Management and Decision Makers
- Continuous Improvement Groups



Approved Group Sdn. Ltd.  
Forensic Group, Malaysia June 2011

## About the Resource Speaker

Rolly, is a seasoned international reliability and maintenance consultant with 23 yrs of solid experience in the field. He had been invited in different countries and have conducted reliability and maintenance trainings in United Arab Emirates, India, Kuala Lumpur, Indonesia, Nigeria and Bangladesh. His portfolio of maintenance trainings include Maintenance Management courses on TPM, Lubrication, Tribology, Condition-Based Maintenance, RCM, RCFA, Planned Maintenance, World Class Maintenance Management, The Twelve Disciplines, Oil Contamination Control, Maintenance Indices and KPI's, Maintenance Management System and much more. Rolly previously worked with Amkor Technology Phils. as a TPM Senior Engineer, an industry engaged in the manufacture of IC products and spearheaded their Planned Maintenance organization compose of maintenance managers and engineers. He was responsible for the dramatic reduction of unplanned breakdowns in their TPM Journey as well as RCM implementation on their Facilities Air Handling Units and as well as their sub-station equipment. Rolly is currently working as an independent reliability and maintenance consultant. He had released his first book on *World-Class Maintenance Management - The 12 Disciplines* a book that makes every maintenance feel proud that they belong to the maintenance function and this is included as part of the package.

*When your maintenance people become really good at fixing failures then you have a big problem, it seems that you cannot get rid of the problem itself in the first place.*



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### About Root Cause Failure Analysis

- It is a common practice due to lack of time and information that equipment and system failures are often investigated at a superficial level. As a result both operators and maintenance keep running unreliable plant, which cause repeated losses and become experts at fixing failures rather than understanding the its causes. This training will help you to learn what a true and meaningful Root Cause Failure Analysis and how deep the probe should be to finally uncover the root causes that will eventually end recurring problem making us proactive

### RCFA Course Objective:

- Understand the importance of Root Cause Failure Analysis as a tool in achieving a Pro-active environment in our workplace
- Provide an understanding on why we need to perform Root Cause Failure Analysis
- Provide an opportunity to practice Root Cause Failure Analysis and the different tools on a real workplace problem situation
- Provide participants a working knowledge of Failure Analysis case study which will enable participants to correctly pinpoint design, installation, operating factors that contribute to short equipment lifespan
- Study the different types of wear and why do mechanical component fails in the first place and how to control them
- Understand how deep our probe or when do we stop with our analysis on Root Cause
- Understand the different levels of Root Cause Failure Analysis and addressing the latent cause of the problem

### Testimonies from delegates

- **Understood that RCFA is about using the word HOW and WHY and not WHO in order to arrive at the Latent Cause of the problem. As a member of the management, we are part of the Latent Cause.** From Ramonchito C. Bringel, Coal Plant Superintendent, Team Energy Corp.,
- **Excellent presentation materials. Excellent knowledge on seminar topic. Excellent example related to RCFA. Trainer good sense of humor.** From J.R. Villanueva, Mechanical Supervisor, Team Energy Corporation
- **The course is well designed for maintenance personnel. The learning from this course is applicable to all plants with recurring failures. If these tools will be used in finding the course of equipment failure, the possibility to recur in the future is avoided.** From Fernando Cabula, Electrical Supervisor, Team Energy Corp.,
- **The course is well designed for the maintenance personnel. The learning from this course is applicable to all plants with recurring failures. If these tools will be used in finding the course of equipment failure, the possibility to recur in the future is avoided.** From Fernando Cabula, Electrical Supervisor, Team Energy Corporation



**RCFA Master Class, Energy Development Corporation, Ormoc, Philippines. July 2011**





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### RCFA DAY 1 : Morning Session

#### Module 1 : Understanding Failures – Why Failures are Important

- Failure defined
- What Famous People Say About Failures
- Lessons from Failures

#### Module 2 : Understanding Root Cause Failure Analysis

- Root Cause Failure Analysis Defined
- Simple Root Cause Case Study – Missing Money
- Difference Between Failure Analysis, RCFA and RCA
- When to use RCFA
- Workshop on sequence of events
- Basic Rule on Root Cause Failure Analysis

#### Module 3 : Top Reasons Why We Need RCFA

- The Need to Analyze Failures
- Management Role on Root Cause

### RCFA DAY 1 : Afternoon Session

#### Module 4 : Physical, Human and Latent Cause of Failures

- Understanding the Physical, Human and Latent Cause
- Root Cause Failure Analysis Logic Tree Diagram
- Difference Between Root Cause and Problem Solving Tools
- Mini RCFA Case Study

#### Module 5 : Discovering Root Cause Failure Analysis - Evidence

- Evidence Defined
- RCFA Tool Kit
- Types of Evidences – Physical, People and Paper Evidence
- Role of Principal Investigator & Evidence Gathering Teams
- How the RCFA Interview Should Be Conducted
- Organizing the Stakeholder Meeting

#### Module 6 : Understanding the Physical Side of Failure

- Why Do Mechanical Components Fail
- Understanding Brittle and Ductile Fracture
- Understanding the Physical Cause of Failures
- Why Do Equipment Lost its Usefulness
- Understanding Common Types of Wear Abrasive, Adhesive, Erosive, Fatigue and Corrosive Wear

8:15 to 8:30 am – Registration  
 8:30 am – Start of Training  
 10:15 to 10:30 am – AM Break  
 12:00 to 1:00 pm – Lunch Break  
 3:15 to 3:30 pm – PM Break  
 5:00 pm – End of Training

The knowledge given was very different from our presumption. Very useful and good discreet knowledge. Importance given on the change of culture which was main solution for all the problems. Changing the Man from the Mirror was a very important message received.  
**O.R. Kamble, Manager, India**

It gives us a clear knowledge on how to apply Root Cause Failure Analysis on our equipment. *This course motivates us to learn how to handle the problem without pin-pointing individuals for the fault and instead go for the more effective way of solving problems using RCFA.* The way we treat problem on the equipment, the more effective way it will increase the efficiency of our plant if we can operate our equipment for a long time without failures. **From Danilo Reyes, Area Shift Supervisor, KILN Production, Apo Cement**

**World Class Maintenance Management**  
 The 12 Disciplines

WCM Book Included  
 In this training



by  
**Rolly Angeles**



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### RCFA DAY 2 : Morning Session

#### Module 7 : Understanding Common types of Bearing Failures

- Common Causes of Bearing Failures
- Lubricant Failure
- Fatigue Failure
- Contamination
- Misalignment
- False Brinelling

#### Bonus Module : Case Study on Why the World Trade Center Collapse

- Physical Cause on Why the World Trade Center Collapse

#### Module 8 : Understanding The Human Side of Failure

- Why Do People Commit Mistakes – Study of Human Errors
- Causes of Human Errors
- 4 Categories of Human Errors
- Understanding Anthropometric Factor
- Understanding Human Sensory Perception
- Understanding Physiological Errors
- Understanding Psychological Errors
- Understanding Slips and Lapses
- Personal Encounter on Human Error

### RCFA DAY 2 : Afternoon Session

#### Module 9 : Case Study on Human Error – Why Did the Titanic Sunk

- Details of the RMS Titanic and Structure
- Key People Involved in the RMS Titanic
- Actual Photos of RMS Titanic Beneath the Atlantic Ocean
- Failure Analysis and Physical Cause on Why the RMS Titanic Sunk
- Human Errors Committed on the RMS Titanic
- Design problems on the RMS Titanic
- Human Cause on Why the RMS Titanic Sunk
- Video Showing on RMS Titanic (Approximately 20 minutes)
- Workshop on RMS Titanic
- Remembering the RMS Titanic

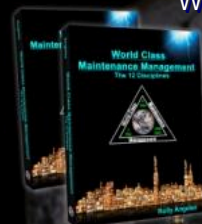
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Informative, interesting and new revelation. This training is full of information new to my knowledge. Root Cause Failure Analysis becomes a thing that needs to be given priority whenever there is an equipment or parts that fail. By ignoring it, fatal incident could happen. This training teaches participants how to conduct Root Cause Failure Analysis in the workplace. It is full of relevant workshops and real situations in life. Rolly was somehow able to elevate every worth not just because of the certificate but this principle I can apply in every aspect of life.

**Ernesto Salarda, Chemist, Energy Development Corporation**

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### RCFA DAY 3 : Morning Session

#### Module 10 : Understanding The Latent Cause of Failure The Challenger Explosion – The Untold Story

- Video Showing on Challenger (1 hr and 21 minutes)
- Compose of 8 Episodes approximately 9 to 10 min. each
- Each Episode will be explained in detailed
- Workshop To Explain if Latent Cause Really Exists and The Need to Expose them in any RCFA Analysis
- Team Presentation
- Lessons Learned From The Challenger Disaster

### RCFA DAY 3 : Afternoon Session

#### Module 11 : RCFA Workshop – Determine the Physical, Human and Latent Cause of the Problem

- Case Study : Pump Failure
- Determine the correct RCFA Logic Tree Diagram
- Determine the Physical, Human Cause and Latent Cause of the Problem
- Team Presentation on RCFA Workshop
- Answer to Case Study on Pump Failure

#### Module 12 : Building RCFA as a Part of a Structures System

- Step by Step Activities on How to Make RCFA as Part of our Structured System
- Delegates to Take Pre-post Quiz on RCFA
- Closing Remarks
- Awarding of Certificates to Delegates

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*Understand the values of components in regards to the reliability of the equipment. The pattern of analyzing failure enables me to show more effort on how to eliminate and reduce cost of parts involve after equipment failed. This training helps me identify details of Root Cause Failure Analysis and to share to fellow mechanics the principles of why-why. From Elijah Loctonagan, Mechanical Technician, Team Energy Corporation, Sual, Philippines*



RCFA Master Class  
 March 21 to 23, 2011  
 Glenmarie Holiday Inn, Malaysia



RCFA Master Class  
 Sept. 30 to October 2, 2010  
 Mumbai, India



RCFA Master Class  
 May 11 to 13, 2011  
 EDC, Ormoc, Philippines



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### Training Investment Costs:

**Costs includes WCM Book**

- 1 Delegate: Php 22,500.00 + 12% VAT
- 2 Delegates: Php 44,000.00 + 12% VAT
- 3 Delegates: Php 64,000.00 + 12% VAT
- 4 Delegates: Php 82,000.00 + 12% VAT
- 5 Delegates: Php 100,500.00 + 12% VAT

• This book is available only through RSA Reliability and Maintenance Consultancy Firm only.

### Payment Procedure and Policy:

- Payment can only be accepted through cash or check basis. For payments in check kindly Pay to RSA Reliability and Maintenance Consultancy Firm. Kindly complete the name of the firm on the check.
- An Official Receipt will be provided after issuance of complete payment for this event.
- Payment should be done during registration, kindly advise the delegates to carry with them the payment for this training. To avoid future problems on our part. No payment, No entry policy would be enforced on this seminar workshop.
- 2% tax will be deducted provided industry joining the event to provide BIR form 2307 together with the payment

### How To Register for this Event:

Step 1: Send us an email on the following:

- Full Name of Delegates: (FN, MI, LN)
- Position or Designation / Department
- Name of Industry
- Type of Industry
- How is payment to be made Cash or Check

Step 2: Once we have confirmed the names of those you will send, we will provide a confirmation email.

Note: You may also register online at our website located at <http://www.rsareliability.com/benefits.htm>  
Once we have confirmed your email we will response promptly to your request.

### Cancellation, Postponement Policy

- For delegates who will not complete the duration of the training seminar and workshop, RSA Reliability and Maintenance Consultancy Firm will offer no refunds regarding this matter, certificates of attendance will only be provided to those delegates that will complete the three day seminar and workshop
- In the event that the seminar will be cancelled as a result of unforeseen events such as Acts of God or other uncontrolled reasons, RSA Reliability and Maintenance Consultancy Firm shall assume no liability whatsoever in the event this seminar and workshop be cancelled, postponed, move or rescheduled due to this fortuitous and unforeseen event.
- In case of a low turn out of delegates for this event, RSA Reliability and Maintenance Consultancy Firm reserves the right to cancel the event. An email will be sent to concerned parties regarding the cancellation.
- In the event you would like to cancel your participation in this seminar, kindly send us an email one week before the event is due. If you have made an advance payment and your delegates did not attend and have not informed us one week before the event, you will be charged with the full amount of the training fee.
- In case the delegate register for this event will not make it on this event, kindly notify us be email the changes in the name of the delegates.

### 100% Money Back Guarantee



- If for any reasons you were not happy or satisfied with the outcome of the training. Our small firm offers you **Unconditional 100% Payment Back** and you keep the WCM Book and all the materials provided during the training provided payment had been received during the registration period.