

Root Cause Failure Analysis

Understanding Machinery Failures

The Physical, Human and Latent Cause of the Problem

November 23 to 24, 2021, and December 8 to 9, 2021



Training Package Includes

- Morning / Afternoon meals and Lunch
- Printed Hard Copy of the RCFA Training
- Important Articles on RCFA
- Detailed Step by Step Guide on How to Conduct the RCFA Process
- Exercises and Workshop on RCFA
- RCFA Case Study Video Showing on the Challenger Disaster
- Actual Case Studies on RCFA
- USB on RCFA which Contains the Training Package
- Video Showing on Challenger Explosion
- WCM Book in pdf copy (314 pages)
- Certificate of Attendance
- Chocolates for the Workshop
- Good Old Rolling Stones Music

About the Resource Speaker

Rolly, is a seasoned international reliability and maintenance consultant with 30 years 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, Malaysia, Indonesia, Brunei, Thailand, Nigeria, Bangladesh, South Africa, China and Botswana. 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 12 Disciplines, Oil Contamination Control, Maintenance Indices and KPI's, Maintenance Management Strategies and much more. Rolly previously worked with Amkor Technology Philippines, as a TPM Senior Engineer, an industry engaged in the manufacture of Integrated Circuit products and spearheaded their Planned Maintenance organization compose of maintenance managers and engineers. He was also responsible for the dramatic reduction of unplanned breakdowns in their TPM Journey as well as RCM implementation on their Facilities AHU units and as well as their substation equipment. Rolly is currently working as an independent reliability and maintenance consultant. Rolly had released his three books title World Class Maintenance Management - The Twelve Disciplines, Maintenance - Roadmap to Reliability and Reliability - A Shared responsibility for operators and maintenance.

We learned how to conduct the root cause and failure analysis of a certain breakdown. We also learned that in order for the RCFA to be successful, all the evidences must be preserved. The principal investigator must select the right people that will gather the physical, human as evidence. Operations people must attend the training on maintenance to know the heart and soul of maintenance.

From Marnold Celis, Diagnostic Manager, Manila Water

Who Should Attend

- Maintenance and Reliability Managers
- TPM Office, Facilitators and Coordinators
- Facilities/Utilities Managers
- Preventive/Predictive Maintenance Group
- Reliability Engineers and Managers
- Operations and Production Managers
- Top Management and Decision Makers
- Continuous Improvement Groups Plant and Facility
- Maintenance Planners
- Mechanical and Electrical People
- Sustaining group, Technicians and involved in repair
- CBM and PdM Personnel
- Maintenance and Reliability Managers
- Maintenance and Technical Support Group
- People in Charge of Planning and Scheduling
- People Involved in Repairs and Troubleshooting
- Head of Maintenance Organization
- Maintenance Engineers
- People Involved in Reliability and Maintenance
- Reliability Engineers and Maintenance Supervisors
- Safety and Quality People are welcome
- People involved in Reliability and Maintenance
- Other Departments are also Welcome in this Training



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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 delegates to learn and understand 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 Proactive 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 the different wear.
- 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
- Finally understand what it takes to address the latent Cause of the problem

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 : Physical, Human and Latent Cause of Failures

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

Module 4 : Discovering the Life Blood of 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 5 : Step by Step Details on How to Probe And Perform Root Cause Failure Analysis

- Step by Step details on performing RCFA

Module 6 : Understanding Why Mechanical Components Fail

- Why Do Mechanical Components Fail
- The Different Types of Wear
- Understanding Brittle and Ductile Fracture
- Understanding the Physical Cause of Failures

END OF DAY 1



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RCFA DAY 2 : Morning Session

Bonus Module: Understanding Common types of Bearing Failures

- Common Causes of Bearing Failures
- Lubricant Failure, fatigue, contamination, misalignment and false brinelling

Module 7 : Understanding The Human Side of Failure

- Why Do People Commit Mistakes – Study 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
- The Circadian Rhythm
- Is it possible to Eliminate Human Error
- The “E – Experiment on Human Error

Module 8 : Understanding The Latent Cause of Failure

The Challenger Explosion – The Untold Story

- Video Showing on Challenger (1 hour and 21 minutes)
- Compose of 8 Episodes approximately 9 to 10 minutes 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
- Lessons Learned From The Challenger Disaster

Module 9 : RCFA Case Study – Determine the Physical, Human and Latent Cause of the Pump Failure

- Case Study : Pump Failure
- Determine the correct RCFA Logic Tree Diagram
- Determine the Physical, Human Cause and Latent Cause
- Addressing the Latencies of the problem

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 Post Quiz on RCFA
- Closing Remarks

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

Excellent content and very knowledgeable facilitator/trainer. The training provided great opportunity to gain knowledge/new learning's in identifying the root cause of equipment breakdowns. The topic Root Cause Failure Analysis paved a way in giving importance to Predictive Maintenance to effectively practice good maintenance. We were able to classify the difference between physical cause, human cause, system cause and the latent cause. We were able to identify the different kinds of wear which is beneficial in our field as we are handling various equipment in the factory. Good training exercises and workshops. The use of videos that are related to the topic make the training interesting and fun. Mr. Angeles is World Class Trainer. *From Krista |Leslie Cars, Area Supervisor, URC Passi*

END OF RCFA MASTER CLASS



DMCI Power Corporation, Calapan, Philippines

Root Cause Failure Analysis
May 15 to 17, 2019



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2019 RCFA Testimonies and Feedback

Excellent course and very useful seminar. I will use everything I have learnt in my daily work as a technical person. From Edwin Ordonia, Supervisor, Allegro Microsystem

The training was very entertaining and easy to understand. It boost our enthusiasm to learn and gain more knowledge. From Jayson Ilagan, Senior Manufacturing Equipment Manager, Allegro Microsystem

Expose the weakness on system with pinpointing culture and lack of teamwork and commitment. Support maintenance goal in achieving equipment with high level of utilization. Understand RCFA and how it works. Understand bearing and basic causes of failures as well as basic lubrication. From Renato Hernandez Jr. Section Head, Allegro Microsystem

The training content was very useful and informative. The training presentation was very clear. From Rodolfo Asaytuno, Section Head, Allegro Microsystem

We learned from the training the techniques on how to conduct Root Cause Failure Analysis. We also learned how and what types of lubricants to be used on different applications and their viscosities. Satisfied with the flow of discussion where every participants cooperates with their sit works. From Jun Abitria, Allegro Microsystem

As discussed, the training was very informative to determine the probable cause of the problem through the use of Root Cause Failure Analysis. From Jeremy Baltazar, Lead Technician Allegro Microsystem

Points of presentation. In depth training. The trainer is resourceful. From Muhammad Razman Bin Roslan, TNB Repair and Maintenance Sdn BHD, Malaysia

Training is full of information and knowledge. I easily understood what the trainer was saying and sharing. This training make me understand on how to perform the Root Cause finding method. From Mohamad Amirul Asarapoo, BSC Integration Solutions Sdn, Bhd, Malaysia

It explains the whole spectrum of RCFA from the management point of view up to the technical side. From M. Fadhlilah B. A. Rahim, Reliability Executive, Petronas Carigall, Sdn, Bhd, Malaysia

Understand the reason for conducting RCFA. Learn the distinction between RCFA and Failure Analysis. Key steps in conducting RCFA. The role of team in performing RCFA. Plenty of references and easy to follow. From Kairul Helmi Bin Hashim, Assistant Manager, Jimah Orm, Sdn, Bhd, Malaysia

Knowing how to conduct RCFA. Knowing that being good in repairing is not a good indication, it shows that the problem of equipment was not fixed. Understand the true relationship between maintenance , operations and management should be. From Mohd Asyrani Bolhassan, Sarawak Shell Berhad, Malaysia

Experienced and knowledgeable trainer. Interesting hand-outs on the training. Informative and relevant to the industry. From Alddyrine Gungat, Kimanis Power, Sdn Bhd, Malaysia

Speaks out the real life problem. Entertaining course due to the facilitator being able to control the crown and make the participant focus. From Wilson Tigus, Sarawak Shell Berhad, Malaysia

Really in-depth training with this course. Will definitely apply this course with the team for any RCFA activities. Train and educate all people on RCFA. From Resa Anak Kana, Sarawak Shell Berhad, Malaysia

We now know how to do Root Cause Failure Analysis Step by Step. It will help us to find the Root of failures that recur. From Paul John Gado, Senior Mechanic, DMCI Calapan

I understand how to construct a Root Cause Failure Analysis Logic Tree through the examples given by Mr. Rolly. From Kristoffer Ramos, Maintenance Superintendent, DMCI Calapan

All the topics discussed were clear that gave us how important RCFA is in our industry to control all the unnecessary recurrence of failure in our equipment which can improve our continuity of service. From Herminio Batoy Jr., Performance Engineer, DMCI Calapan

The training is smooth and the learning's were clearly delivered. I give 5 points for this training by Mr. Rolly Angeles. From Ariel Arita, Plant Operator, DMCI Calapan



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Training Investment Costs:

- 1 Delegate: Php 15,500.00 + 12% VAT
- 2 Delegates: Php 30,700.00 + 12% VAT
- 3 Delegates: Php 45,300.00 + 12% VAT
- 4 Delegates: Php 59,600.00 + 12% VAT
- 5 Delegates: Php 73,000.00 + 12% VAT

If your company is **NON-VAT** send us your supporting documents.

Payment Procedure and Policy:

- Since this is an Online training, we accept bank or wire transfer or cheque payments. For check payment kindly pay to RSA Reliability and Maintenance Consultancy Firm. Do not shortcut my company name to avoid problems with the bank..
- Official Receipt will be provided after issuance of the complete payment together with BIR form 2307 for Philippine clients only.
- Payment should be done during the day of the training. If this is not possible, provide us a clear date on when we can get the payment.
- 10% Tax can be deducted from the total cost of training provided industry joining the training to provide BIR form 2307 together with the payment

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.

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 whole training.
- In the event that the seminar will be cancelled as a result of unforeseen events such as Acts of God or blackouts or problems on internet connectivity. We shall resume the training the following day or we shall send you an email on the date that the training will be resumed.
- 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 through email regarding the changes in the name of the delegates.

How To Register for this Event:

Step 1: Send us an email on the following:

- Full Name of Delegates: (FN, MI, LN)
- Email of participating delegates
- Position or Designation / Department
- Name of Industry
- Type of Industry
- How is payment to be made Cash or Check
- Is your industry VAT or NON-VAT

Step 2: Once we have confirmed the names of those you will send, we will provide a confirmation email. Strictly No last minute registration will be allowed. We will be using MS Teams as the online platform.



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